JUN 20 1922

VOL. 48 JUNE, 1922 No. 232

Engineering Library

United States Naval Institute

Proceedings

The writers only are responsible for the contents of their respective articles

CONTENTS

Engagement Between the "Cumberland" and "Merrimack."—O'Neil	863	A Program for Naval History.—Scammell	973
The Russian Navy and the Revolution.—Fedotov	895	The Navy and Business.—Coontz	987
Some Mutual Relations of Gunnery and Tactics.—Earle	917	Discussion	1005
The Supply Corps Schools of Application.—McIntosh	953	Secretary's Notes	1009
Maintaining Youth in Service.—Aamold	959	Professional Notes	1013
Approach Omnimeter.—Bray	965	Notes on International Affairs	1061
		Book Reviews	1069
		Information Index	1011

Copyright, 1922, by J. W. Conroy, Trustee for U. S. Naval Institute

Published monthly by the U. S. Naval Institute, at 450 Ahnaip St., Menasha, Wis.

Executive and Editorial Offices, United States Naval Institute, Annapolis, Md.

Entered as second-class matter at the post-office at Menasha, Wis., April 4, 1922, under Act of Aug. 24, 1912. Acceptance for mailing at the special rate of postage provided for in section 1103, Act of Oct. 3, 1919, authorized Mar. 13, 1922.

The Mark of Quality and the Seal of Protection

From time to time in the Navy you will witness the genuine service rendered by products of the United States Rubber Company—insulated wire and cable, rubber footwear, tires, belts, fabrics, gas masks, hospital supplies, soles and heels and many other commodities bearing the U. S. trademark.

For your own personal equipment it is advantageous to remember our products by their trade names—Raynster raincoats; Naugahyde bags and belts; U. S. rubber footwear; Keds, the superior canvas rubber-soled shoes; U. S. Spring-Step rubber heels and Uskide soles.

United States Rubber Company

Vol. 48, No. 6 June, 1922 Whole No. 232

United States Naval Institute

Proceedings

PUBLISHED MONTHLY
EDITED BY F. M. ROBINSON

U. S. NAVAL INSTITUTE

PUBLICATION OFFICE: MENASHA, WISCONSIN
EDITORIAL AND BUSINESS OFFICE: ANNAPOLIS, MARYLAND

COPYRIGHT, 1922
By J. W. CONROY
TRUSTEE FOR U. S. NAVAL INSTITUTE

The Collegiate Press
GEORGE BANTA PUBLISHING CO.
MENASHA, WIS.

The writers only are responsible for the contents of their respective articles

CONTENTS

ENGAGEMENT BETWEEN THE "CUMBERLAND" AND "MERRIMACK." By Rear Admiral Charles O'Neil, U. S. Navy, Retired 863

THE RUSSIAN NAVY AND THE REVOLUTION. By Dimitri Fedotov, Ex-Lieutenant Commander, Imperial Russian Navy 895

SOME MUTUAL RELATIONS OF GUNNERY AND TACTICS. By Captain Ralph Earle, U. S. Navy 917

THE SUPPLY CORPS SCHOOL OF APPLICATION. By Lieutenant Commander K. C. McIntosh, S. C., U. S. N. 953

MAINTAINING YOUTH IN SERVICE. By Walter Aamold 959

APPROACH OMNIMETER. By Lieut. Commander S. E. Bray, U. S. Navy 965

A PROGRAM FOR NAVAL HISTORY. By Captain J. M. Scammell, Inf. R. C., U. S. Army 973

THE NAVY AND BUSINESS. By Admiral Robert E. Coontz 987

DISCUSSION 1005

SECRETARY'S NOTES 1009

PROFESSIONAL NOTES 1013

NOTES ON INTERNATIONAL AFFAIRS 1061

BOOK REVIEWS 1069

INFORMATION INDEX 1011

OFFICERS OF THE INSTITUTE

President

REAR ADMIRAL BRADLEY A. FISKE, U. S. NAVY

Vice-President

REAR ADMIRAL HENRY B. WILSON, U. S. NAVY

Secretary and Treasurer

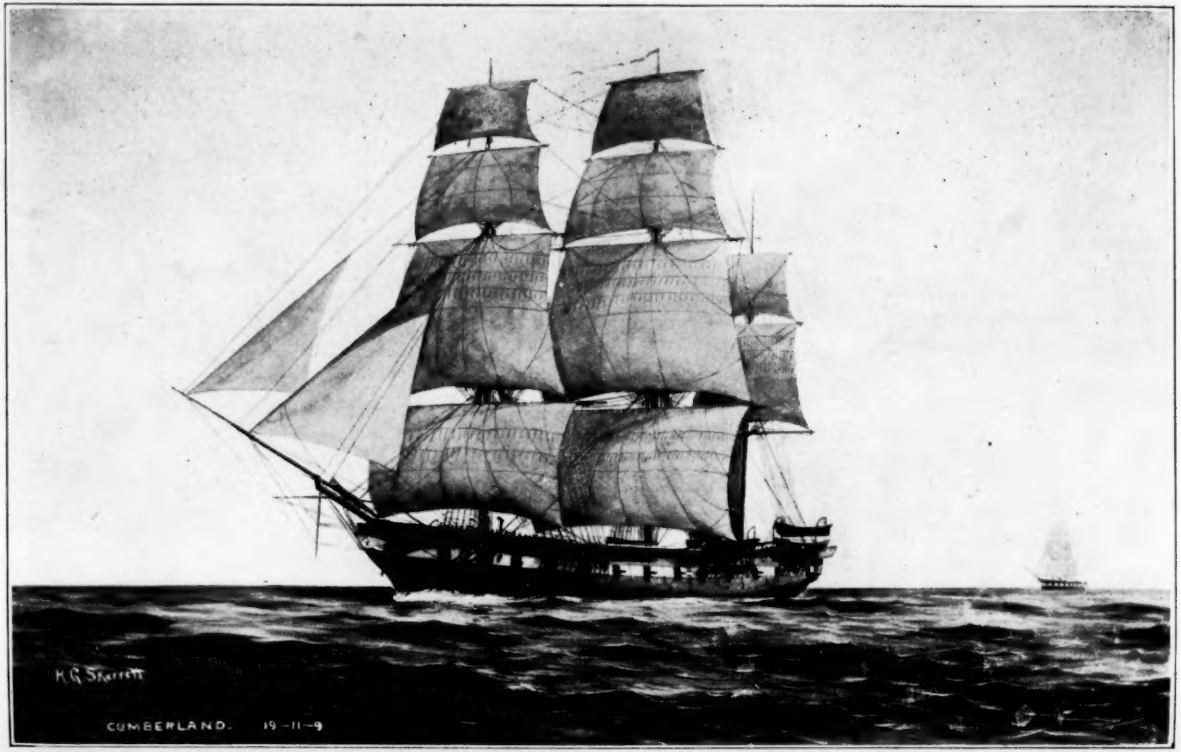
LIEUT. COMMANDER F. M. ROBINSON, U. S. NAVY

Board of Control

REAR ADMIRAL BRADLEY A. FISKE, U. S. NAVY (*ex officio*)
REAR ADMIRAL HENRY B. WILSON, U. S. NAVY (*ex officio*)
BRIGADIER GENERAL GEORGE RICHARDS, U. S. M. C.
CAPTAIN JOHN HALLIGAN, JR., U. S. NAVY
CAPTAIN J. A. FURER, (C. C.), U. S. NAVY
COMMANDER JOHN DOWNES, U. S. NAVY
COMMANDER J. O. RICHARDSON, U. S. NAVY
COMMANDER H. D. COOKE, U. S. NAVY
LIEUT. COMMANDER F. M. ROBINSON, U. S. NAVY (*ex officio*)

PAST PRESIDENTS

ADMIRAL DAVID D. PORTER, U. S. NAVY, 1873
REAR ADMIRAL JOHN L. WORDEN, U. S. NAVY, 1874
REAR ADMIRAL C. R. P. RODGERS, U. S. NAVY, JAN. 1875–JAN. 1878
COMMODORE FOXHALL A. PARKER, U. S. NAVY, JAN. 1878–JAN. 1879
REAR ADMIRAL JOHN RODGERS, U. S. NAVY, JAN. 1879–JAN. 1882
REAR ADMIRAL C. R. P. RODGERS, U. S. NAVY, JAN. 1882–JAN. 1883
REAR ADMIRAL THORNTON A. JENKINS, U. S. NAVY, JAN. 1883–OCT. 1885
REAR ADMIRAL EDWARD SIMPSON, U. S. NAVY, OCT. 1885–OCT. 1887
REAR ADMIRAL STEPHEN B. LUCE, U. S. NAVY, OCT. 1887–OCT. 1898
REAR ADMIRAL WM. T. SAMPSON, U. S. NAVY, OCT. 1898–OCT. 1902
REAR ADMIRAL H. C. TAYLOR, U. S. NAVY, OCT. 1902–OCT. 1904
REAR ADMIRAL C. F. GOODRICH, U. S. NAVY, OCT. 1904–OCT. 1909
REAR ADMIRAL RICHARD WAINWRIGHT, U. S. NAVY, OCT. 1909–OCT. 1911



UNITED STATES SHIP "CUMBERLAND"

UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. No. 48, No. 6 **JUNE, 1922** **Whole No. 232**

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ENGAGEMENT BETWEEN THE "CUMBERLAND" AND "MERRIMACK"

By Rear Admiral Charles O'Neil, U. S. Navy, Retired

The eighth of March, 1862, was a calm and beautiful day of early spring at Newport News, Virginia. It was Saturday and the frigate *Congress* and the *Cumberland* were lazily riding at anchor to the end of the flood tide at the mouth of the James River. There was a light breeze from the N. N. W., and nothing occurred to disturb the serenity of the forenoon. Commander Radford of the *Cumberland* was absent from the ship, being a member of a court of inquiry in session at Hampton Roads.

The crew had just had dinner when at 12:40 P. M., heavy black smoke was seen in the direction of Craney Island, and soon after the hull of a large vessel shaped like the roof of a house, with one smokestack, appeared in sight accompanied by two small steamers, steaming slowly in the direction of Sewell's Point. We knew at once that the large vessel was the former *Merrimack* which had been converted at Norfolk into an iron-clad and renamed the *Virginia*. We afterwards learned that she was commanded by Flag-Officer Franklin Buchanan of the Confederate States navy, and that the smaller vessels were the *Beaufort*, lieutenant commanding, W. H. Parker; and the *Raleigh*, lieutenant commanding, J. W. Alexander. At about the same time two steamers were

UNITED STATES SHIP "CUMBERLAND"

observed coming down the James River, which proved to be the *Patrick Henry* of twelve guns, Commander Robert R. Tucker; and the *Jamestown* of two guns, lieutenant commanding, W. A. Webb. As soon as the enemy's vessels were discovered, the sails, which had been loosed to dry, were furled; the wash clothes were piped down; the boats were lowered and dropped astern, springs were put on the port cable, to which the ship was riding, and the "quick beat" to quarters was sounded. The guns, which were already loaded, were double breeched; the pumps were rigged; the decks were sprinkled and sanded, and all the usual preparations for battle were made. In the absence of Commander Radford the *Cumberland* was for the time being in command of Lieutenant George U. Morris, who was the executive officer; Lieutenant Selfridge commanded the forward gun-deck division of five nine-inch guns on each side, and I was stationed in his division; the next four guns on each side were under the command of Moses S. Stuyvesant, the master, and the two after guns on each side were manned by marines. The forward ten-inch pivot gun on the upper deck was in charge of Acting Master Wm. N. Kennison, and the after pivot gun was in charge of Acting Master Wm. P. Randall. Sailmaker David Bruce and Gunner Eugene Mack were in charge of the powder divisions. The *Merrimack* kept on her way towards Sewell's Point, and owing to the contour of the land was lost to our view for nearly an hour, and we were uncertain as to her movements, and thought perhaps she had gone to Hampton Roads to attack the vessels there, but all doubts upon this point were dispelled when she again appeared in sight at about 2:30 P. M., heading directly for us. As we were heading downstream, our guns could not be brought to bear upon her and efforts were made to spring the ship, but owing to its being slack water, they were futile. Nor could we see the approaching enemy from the broadside gun ports, as she was almost directly ahead of us, and while the guns' crews were waiting for an opportunity to open fire, I stepped forward to a bridle port in which there was no gun and had a good look at the *Merrimack* as she passed the *Congress*, only a short distance from us, when I was summoned back to my station.

She appeared to have one bow gun and three or four on each

side, and flew the Confederate flag, which at a distance looked not unlike the French flag.

As she passed the *Congress* that vessel fired a broadside into her at short range, apparently without effect, as she slowed down and manœuvred for position, ahead of us, and it seemed uncertain as to on which side we were to receive her attack. Her first shot at us swept across the quarter deck, crashing through the bulwarks and skylights, and mowing down some of the marines who were drawn up in that part of the ship. The crash and the cries of the wounded as they were carried below was the introduction to a scene of carnage and destruction which cannot be adequately described. Finally the *Merrimack* took a position three or four hundred yards distant, on our starboard bow, from which she delivered shot after shot at us, with precision from her seven-inch rifle gun which wrought terrific havoc among the men of the forward gun-deck division of the *Cumberland,* which received the brunt of the attack, while she herself was so far forward that none of our guns could be brought to bear upon her. Early in the engagement, a seven-inch shell from the *Merrimack* burst in the forward part of our gun deck, filling it with smoke, demolishing the galley, and practically wiping out the whole of No. 1 gun's crew, the captain of which, a man named Kirker who was formerly the commodore's coxswain, had both arms shot off. From her favorable position, the *Merrimack* kept up a deadly and destructive fire on our ship for from ten to fifteen minutes, during which we had swung slightly so as to expose more of our starboard side, when she started ahead under full steam and in a brief interval struck us a staggering blow below the water line, just forward of our starboard fore chains. The crash of timber could be heard as the *Cumberland* surged on her chain cable and reeled under the force of the blow. The two vessels lay motionless for some moments when the *Merrimack* cleared herself from the encounter and forged slowly ahead, presenting her starboard side to ours, and both vessels then opened fire on each other at a range not exceeding two hundred yards. In this position we had eleven nine-inch, one ten-inch, and one six-inch rifle guns bearing on the enemy, which were served with great rapidity, and the range was so short that it would have been next to impossible not to hit her.

The *Merrimack's* boats and flagstaffs were soon shot away; her smokestack was riddled, and the muzzles knocked off of two of her guns, but apparently her hull suffered but little, if any, from our heavy fire which would have demolished a wooden vessel in a short time. The shot and shell from the *Merrimack* crashed through the wooden sides of the *Cumberland* as if they had been made of paper, carrying huge splinters with them and dealing death and destruction on every hand. Many were killed outright and others wounded and terribly mangled, and the scenes in the cock-pit and sick-bay, whither the wounded were carried, must have been heart-rending. The dead on the gun deck were carried to the opposite, the port side, and the wounded sent below as fast as possible, their stations at the guns being filled by those remaining. Several shot and shell entered on one side and passed out through the other carrying everything before them, and the smoke, the booming of the guns, the crash of splintered woodwork and the cries and groans of the wounded, were appalling, but were offset in a measure by the cheering of the men at the guns, who fought with determination and enthusiasm. The once clean and beautiful deck was slippery with blood, blackened with powder and looked like a slaughter house, and was a scene of destruction and wreckage throughout. A couple of soldiers from the camp on shore were on board as visitors during the forenoon and as they could not get on shore they turned to and helped at the guns. They were both killed and could be distinguished from the sailors by their red shirts.

The water was rushing in through the rent made by the prow of the *Merrimack* and the pumps were manned, but they were inadequate as the water came in faster than it could be pumped out, and as it was only a question of time when the forward magazine would be flooded, whole tanks of powder for the forward guns were passed up on to the berth deck, and ultimately it became necessary to get powder from the after magazines for the entire battery. At one time the *Merrimack* came so near us that it looked as if she was coming alongside and our boarders were called away, and repaired with their cutlasses and pistols to the upper deck. My station required me to accompany them and I also went to the spar deck, but as the vessels drew apart, we were ordered back to our stations on the gun deck.

Our marines and such of the crew on the upper deck as were armed with rifles, were firing at the enemy's port holes in hopes of doing some execution, and subsequent reports showed that they did kill and wound some of the *Merrimack's* crew. In the meantime, the *Congress* had slipped her cable, set her jib and topsails and with the aid of the tug *Zouave* was run ashore, bows on, near Signal Point and saved from being sunk, but for another fate. Orders were given to slip our cable, and Master's Mate Harrington and myself were directed to attend to the matter. The ship was riding by the port chain and Mr. Harrington was to attend at the forward compressor, and I was to have the chain unshackled, further aft. My part was attended to all right, and finding that something had evidently gone wrong, I ran forward to see what the matter was, and looked round for Harrington and in a moment saw his lifeless body lying flat on its back, a shell having completely cut his head off, while the four men who were to tend the compressor were stunned, and spattered with the blood and brains of that unfortunate officer. The ship was gradually settling by the head and listing to port and it was evident that she was sinking, but the battle went on without interruption. Lieutenant Selfridge encouraged his men and certainly set them an example of courage and coolness. The guns from the battery on shore at Newport News, consisting of four Columbiads and one forty-two-pounder James rifle, kept up a steady fire on the enemy and with those of the Confederate vessels and our own created a din that was appalling and deafening. In from twenty to thirty minutes from the time we were rammed, the *Cumberland* had settled so far by the head that her gun-deck bow ports were within a foot or so of the water, and at this time Lieutenant Morris stepped down from the spar deck, and seeing that the ship must immediately sink, gave the order for the crew to save themselves, and then, but not till then, did they leave their stations. In a few moments more the water rushed in at the bow ports: the ship listed heavily to port and soon went down with a rush of escaping air in a seething whirlpool: her flag still flying, but carrying with her all the dead and wounded. The condition of those below decks, especially the wounded, must have been pitiful in the extreme, there being no possible escape for most of them. The ship sank in about fifty-four feet of water so that everything above the tops

was out of water, including the peak of the spanker gaff to which the colors were still flying, when she rested on the bottom. I made my escape through one of the hatches leading to the spar deck, and when I reached it the ship had heeled over so far to port that it was with difficulty that I ran aft along the waterways to the stern, where I threw off my coat and sword and jumped overboard and scrambled into the sailing launch, which with the rest of the boats was lying astern.

There were men in the water all about and among them I saw Lieutenant Morris, struggling by himself, so I passed him a boat-hook to take hold of, and drew him alongside, and with the aid of some others he was hauled aboard, saying, "Don't let go of me for I can't swim."

The men climbed into the various boats which were soon filled, and many who had escaped through the port holes and the forward hatches took refuge in the rigging until they were rescued by some of our boats later on, and all who got out of the ship were now practically safe as the enemy ceased firing at us when the ship went down, and made no attempt to molest us afterwards. As the ship heeled over in the act of sinking, some of the starboard guns got adrift and crashed across the deck, adding to the dangers to which the crew had already been exposed. In fact, the after pivot gun flew across the deck just after I had passed it. The boats pulled ashore and the survivors disembarked at the little wharf abreast the camp, and one of General Mansfield's aides, Captain Drake DeKay, who was on the wharf shouted rather excitedly to our men "to help man the battery on the bluff," and then left. As soon as our men were landed Lieutenant Morris took one of the cutters and pulled back to the ship to see if he could recover the flag and if any more men were to be found, and I went with him but we found neither. Lieutenant Selfridge pulled out in another cutter for the same purpose, and he informed me at a later period that he recovered the flag and took it on shore and rolled it up in a bundle and placed it under a sofa in General Mansfield's quarters, intending to get it when the excitement was over, and late in the day after the battle was over he went to look for it and it was gone. Who took it or what became of it has never been learned. The *Merrimack* had gone up the river a short distance to turn round, and having disposed of the *Cumber-*

land now turned her attention to the *Congress*. As I was on the gun deck throughout the engagement except during the brief interval when the boarders were summoned, I could not tell what took place on the upper deck, but on one or two points I have a decided opinion. It has been stated by what might be called good authority, that after the *Merrimack* had rammed us, she hailed us, demanding our surrender, and that Lieutenant Morris replied that "we would sink first." Lieutenant Morris makes no mention of this in his official report of the engagement, which it is true is very meager, making no reference to any details, nor does Flag Officer Buchanan in his report to the secretary of the Confederate States navy, which is very full, refer to such an incident. As the *Merrimack* struck us forward and Lieutenant Morris was aft, it would have been extremely difficult if not impossible for him to have heard a hail from the *Merrimack* amid the din of the cannonading, and no one on board of the *Merrimack* could have ventured outside of her armored casemate or pilot house without having been picked off by our sharpshooters. Moreover, as she had already given us our "coup de grace," it would seem foolish to demand the surrender of a sinking ship, so that I am very doubtful if the incident occurred. It has also been said that the *Merrimack* rammed us a second time, but if she did, I have no recollection of it nor do I think she did, for to have done so would have necessitated her abandoning a very favorable position off our starboard beam and making a complete circle which not only would have occupied several minutes but would have seriously interfered with her gun fire, and as Flag Officer Buchanan makes no reference to such a proceeding I am strongly of the opinion that it did not take place. The vessels lying in Hampton Roads could not see the *Merrimack* coming out from Norfolk until a good while after we did, owing to the interference of the land. As soon, however, as they saw her and found that she was heading for the James River, the *Minnesota*, a fifty-gun frigate, slipped her cable and started up the river to go to the assistance of the vessels lying off Newport News. The *Roanoke*, a sister ship to the *Minnesota*, which was lying in Hampton Roads with a broken shaft, was taken in tow by two tugs and also started for Newport News. When seven or eight miles from Fortress Monroe, the *Minnesota* grounded at about 3 P. M. and stuck fast in the mud.

The *Roanoke* proceeded some distance but got into three and one-half fathoms of water, and was aground aft, so she, with the aid of her tugs, was turned round and headed for Hampton Roads.

The sailing frigate *St. Lawrence*, also at Hampton Roads, was taken in tow by the U. S. S. *Cambridge*, and started for our relief, but she also got aground, but was gotten afloat again but too late to be of any assistance, so she returned to the Roads. While passing the batteries at Sewell's Point they opened fire on her and also on the *Roanoke*, one shot going through the foresail of the latter vessel and cutting away two of her shrouds. It was quite apparent that no relief was to be expected from the fleet at Hampton Roads, owing to its distance away, and to intervening shoal water. When Commander Radford learned that the enemy had come out and was heading for Newport News, he went on shore from the *Roanoke* and obtaining a horse, set out for that place, but long before he arrived there, his ship, the *Cumberland*, had been sunk. In his official report of the disaster to the navy department, Commander Radford gives the following list of officers saved from the *Cumberland:*

William Radford, Commander. (Not on board.)
George U. Morris, Lieutenant.
Thomas O. Selfridge, Jr., Lieutenant.
Moses S. Stuyvesant, Master.
William P. Randall, Acting Master.
William N. Kennison, Acting Master.
Charles Heywood, Lieutenant of Marines.
Lewis Smith (Civilian), Pilot.
Charles Martin, Surgeon.
Edward Kershner, Assistant Surgeon.
Edward B. Bell, Boatswain.
Eugene Mack, Gunner.
William L. Leighton, Carpenter.
David Bruce, Sailmaker.
Charles O'Neil, Master's Mate.
Henry Wyman, Master's Mate.
E. V. Tyson, Master's Mate.
Hugh Nott, Paymaster's Clerk.
Cramer Burt, Paymaster. (Absent on leave.)
Lewis Ketchum, Captain's Clerk. (Not on board.)

Officers Killed

John Lenhart, Chaplain. (Drowned.)
John M. Harrington, Master's Mate. (Killed.)

Officers and men, when action commenced	376
Officers and men, when action was over	255
Number of killed and drowned	121

At about 3:30 P. M. the *Merrimack* took a position astern of the *Congress*, at a distance of not over three or four hundred yards and opening fire on her, raked her fore and aft, and the smaller steamers kept up a continuous fire on her and the camp on shore, which replied from its battery. On January 13th, 1862, the *Congress* had paid off some three hundred of her crew, and owing to the difficulty of filling their places, Company D of the 99th Regiment, New York State Volunteers, under the command of Captain William J. McIntire, was detailed to help fill her complement and was on board at the time of the engagement with the *Merrimack*, as was also Second Lieutenant George Elder and eighty-seven enlisted men. Owing to the position taken by the *Merrimack*, the *Congress* could only bring her two stern guns to bear upon her, and these were soon disabled by the enemy's fire, one being dismounted and the other having its muzzle knocked off. Lieutenant Joseph B. Smith, who was in command of the *Congress*, was killed and the command devolved upon Lieutenant Austin Pendergrast. Commander William Smith, U. S. N., was also on board the *Congress*, having recently been in command of her, but had received his detachment, the command devolving upon Lieutenant Joseph B. Smith, who was killed as before stated.

The *Congress* being in a defenseless position, her decks being raked fore and aft by the enemy's shot and shell, and having lost many lives, and being on fire in several places, hauled down her colors at about 4 P. M. Lieutenant Pendergrast in his official report says "upon consultation with Commander William Smith, we deemed it proper to haul down our colors without further loss of life on our part."

This took place at ten minutes to four o'clock on the afternoon of March 8th, 1862. In a short time after, the Confederate States tug *Beaufort* ran alongside the *Congress* which had hoisted a white flag, and an officer from the tug boarded the latter and ordered

the men ashore, saying he would take the officers as prisoners and burn the ship. At this point, the troops on shore opened fire on the *Beaufort* with such effect that she was forced to retire in haste, some twenty of the crew of the *Congress* jumping on board of her, which were the only prisoners taken. As soon as the *Beaufort* was well clear, the *Merrimack* again opened fire on the *Congress,* whose boats had been lowered, and such of the crew as were left alive, jumped into them, taking the wounded with them, or swam ashore, and the ship, which was on fire in several places, was abandoned to her fate. Brigadier General Joseph K. F. Mansfield commanding the military post at Newport News, in his report to Major General John E. Wool, commanding the department of Virginia, says, concerning the surrender of the *Congress,* when she hauled down her flag and hoisted a white flag and ceased action, "The enemy then sent two steamers with Confederate flags flying, and made fast on either side of her (the *Congress*) with a view to haul her off or burn her. As soon as I saw this I ordered Colonel Brown of the Twentieth Indiana Regiment, then close at hand, to send two rifle companies (A and K) to the beach. The two rifle guns under Captain Howard, and a rifled Dahlgren howitzer manned by Master Stuyvesant and fourteen sailors of the *Cumberland* went into action from a raking position on the beach, covered by sand banks and trees against these steamers. We here had them at about 800 yards to advantage, and immediately they let go their hold on the *Congress* and moved out of range, with much loss. They endeavored to approach her again with a steamer and row boat but were beaten off with loss, till finally the *Merrimack* finding her prize re-taken, approached and fired three shots into her and set her on fire."

Flag Officer Franklin Buchanan, who commanded the *Merrimack* and whose brother Paymaster McKean Buchanan was on board the *Congress* in this engagement, makes the following remarks, in his official report to the Hon. S. R. Mallory, secretary of the Confederate States navy, under date of March 27th, 1862. "The carnage, havoc and dismay caused by our fire, compelled them (the *Congress)* to haul down their colors and to hoist a white flag at their gaff, and half mast another at the main. The crew instantly took to their boats and landed. Our fire immediately ceased, and a signal was made for the *Beaufort* to come within

hail. I then ordered lieutenant commanding, Parker, to take possession of the *Congress,* secure the officers as prisoners, allow the crew to land, and burn the ship. He ran alongside, received the flag and surrender from Commander William Smith and Lieutenant Pendergrast, with the side arms of these officers. They delivered themselves as prisoners of war on board the *Beaufort,* and afterwards were permitted at their own request to return to the *Congress* to assist in removing the wounded to the *Beaufort.* They never returned, and I submit to the decision of the department whether they are not our prisoners. While the *Beaufort* and *Raleigh* were alongside the *Congress,* and the surrender of that vessel had been received from the commander, she having two white flags flying, hoisted by her own people, a heavy fire was opened upon them from the shore and from the *Congress,* killing some valuable officers and men. Under this fire the steamers left the *Congress*—and I took it for granted that my order to Lieutenant Parker to burn the vessel had been executed, and waited some minutes to see the smoke ascending the hatches. The steam frigates *Minnesota* and *Roanoke* and the sailing frigate *St. Lawrence* had previously been reported as coming from Old Point, but as I was determined that the *Congress* should not again fall into the hands of the enemy, I remarked to that gallant officer, Flag Lieutenant Minor, 'That ship must be burned.' He promptly volunteered to take a boat and burn her, and the *Teaser,* lieutenant commanding, Webb, was ordered to cover the boat. Lieutenant Minor had scarcely reached within fifty yards of the *Congress* when a deadly fire was opened upon him, wounding him severely and several of his men. On witnessing this vile treachery (see note following) I immediately recalled the boat and ordered the *Congress* destroyed by hot shot and incendiary shell." (Note by C. O. N.: The term "vile treachery" used by Flag Officer Buchanan in his report was unwarranted, as the troops on shore had not surrendered and it was their duty to prevent as far as lay in their power the enemy from taking possession of the *Congress* even if she had struck her colors. In fact, they would have been culpable if they had not done their utmost to drive away the enemy. It does not appear that anyone who was attached to the *Congress* at the time of her surrender, participated in the act which Flag Officer Buchanan stigmatizes as "vile treachery.")

Flag Officer Buchanan also says in his report, referring to the *Cumberland*, "In about fifteen minutes after the action commenced we ran into her on starboard bow: the crash below the water was distinctly heard, and she commenced sinking, gallantly fighting her guns as long as they were above water. She went down with her colors flying."

Many years after this event, I made the acquaintance of Hunter Davidson at Buenos Aires, where he had charge of the Argentine steamer *Fulminante* which was used as a torpedo depot and mining school for the Argentine navy, and of John Taylor Wood at Halifax, Nova Scotia, both of whom were officers on board the *Merrimack* during the engagements off Newport News, and in Hampton Roads on March 8th and 9th, 1862, and we had many interesting talks with regard to them. The *Congress* having been set on fire by the enemy's projectiles continued to burn throughout the rest of the afternoon and evening; her loaded guns being successively discharged as the heat and flames reached them, until a few minutes past midnight when her magazine exploded with a loud report and she was completely wrecked. Lieutenant Pendergrast reported to the secretary of the navy the casualties which occurred on board the *Congress* on March 8th as follows:

Total number of officers and men on board at the beginning of the engagement	434
Total number accounted for, saved	298
Number of killed, wounded, and missing	136
Number of wounded taken on shore	26
Number of killed and missing	110
Number of wounded since died	10
Total number of killed, missing, and died on shore	120

Lieutenant Pendergrast in his official report dated March 9th, 1862, gives the following version of the surrender of the *Congress:*

"At about 4:30 I learned of the death of Lieutenant Joseph Smith, which happened about ten minutes previous. Seeing that our men were being killed without the prospect of any relief from the *Minnesota*, which vessel had run ashore in attempting to get up to us from Hampton Roads; not being able to bring a single gun to bear upon the enemy, and the ship being on fire in several

places, upon consultation with Commander William Smith, we deemed it proper to haul down our colors without any further loss of life on our part. We were soon boarded by an officer from the *Merrimack* who said he would take charge of the ship. He left shortly afterwards and a small tug came alongside whose captain demanded that we should surrender and get out of the ship, as he intended to burn her immediately. A sharp fire with muskets and artillery was maintained by our troops on shore upon the tug, having the effect of driving her off. The *Merrimack* again opened fire upon us, although we had a white flag at the peak, to show that we were out of action. After having fired several shells into us she left us and engaged the *Minnesota* and the shore batteries. We took this opportunity to man the boats and send the wounded ashore.

"We then ourselves left, the ship being on fire near the after magazine and in the sick bay. In fact the ship was on fire from the commencement to the end of the action; three times in the sick bay and wardroom and twice in the main hold, produced by hot shot thrown from the *Merrimack*. I lament to record the deaths of the following officers: Lieutenant Joseph B. Smith; Acting Master Thomas Moore and Pilot William Rhodes (wounded), since dead."

It will be observed that there are some discrepancies between the reports of Lieutenant Pendergrast and Flag Officer Buchanan with regard to this affair, which was a peculiar one, the victors not being able to reap the fruits of their victory owing to the interference of our military forces. Under the circumstances there was nothing for the Confederate naval forces to do but to again open fire on the ill-fated *Congress* and set her on fire. During the time the Confederate officers were occupied with the surrender of the *Congress*, Flag Officer Buchanan was, according to his own account and report, disabled by a minié ball from shore which passed entirely through the fleshy portion of the left thigh, grazing the femoral artery and inflicting a serious wound, and the command of the *Merrimack* devolved upon her executive officer, Lieutenant Catesby, ap R. Jones, who reported: "Our loss is two killed and eight wounded; two of our guns have the muzzles shot off. The prow was twisted and the armor somewhat damaged;

the anchors and flagstaffs shot away, and smokestack and steam-pipe were riddled."

The officers of the *Merrimack* in this memorable engagement were as follows:

Franklin Buchanan, C. S. N. Flag Officer, commanding.
Catesby ap R. Jones, Lieutenant, Executive Officer.
Lieutenant Simms, C. S. N.
Lieutenant Hunter Davidson, C. S. N.
Lieutenant John Taylor Wood, C. S. N.
Lieutenant J. R. Eggleston, C. S. N.
Lieutenant W. R. Butt, C. S. N.
Captain Thom, Marine Officer, C. S. N.
Paymaster James A. Semple, C. S. N.
Surgeon D. B. Phillips, C. S. N.
Assistant Surgeon Garnett, C. S. N.
Midshipmen—Foute, Marmaduke, Craig, Littlepage, and Long.

It is fair to assume that Flag Officer Buchanan's report as to the time he was wounded, and how, is correct, and yet I have been told that a medal was presented to a corporal of marines, by his friends, who claim that he fired the shot which wounded the flag officer from the deck of the *Cumberland*, whereas the flag officer states that he received his wound by a ball from shore, long after the *Cumberland* was sunk, and I prefer to take his statement of the fact as the correct one.

The officers and men from the *Cumberland* who reached the shore became scattered throughout the camp at Newport News. Some went to the battery, and others were watching the attempts of the enemy to take possession of the *Congress*. After my return from the trip to the wreck of the *Cumberland* with Lieutenant Morris, I met our pilot, Mr. Smith, and with him walked down to the beach in the direction of the *Congress*, which had two white flags flying, her ensign having been hauled down. We saw the two tugs go alongside of her and also saw them driven off by the fire from the camp, after which the *Merrimack* again opened fire on the *Congress*. The shells were flying over our heads in a very uncomfortable manner, when we met Lieutenant Selfridge near some large trees. A shell came whizzing along, passing over our heads and the pilot and I involuntarily ducked our heads and each of us got behind a good-sized tree, seeing which Lieutenant Selfridge, who was very much affected, said,

"Don't dodge, I wish one would kill me; I'd rather be killed than be whipped," but we thought otherwise and our trees gave us a sense of security, if nothing more. We watched the proceedings until the *Congress* was abandoned and then went into the camp. Being minus a coat and being wet and beginning to feel cold, I went to the tent of one of the officers I knew and helped myself to a gray military overcoat and a pair of boots. The camp was of course under arms and it was thought that an attack would be made upon it from the rear, but none came.

When the destruction of the *Congress* was assured beyond a doubt, the *Merrimack* and her consorts withdrew at about 6 P. M., firing a few parting shots at the camp, and steamed in the direction of Norfolk.

We wandered about the camp and later I found my friend whose coat and boots I had taken, who not only insisted on my keeping them but also gave me a cap which was dry, whereas mine was wet and uncomfortable, so I gladly accepted it, and for the time being I was rigged out in soldier clothes. The darkness came on and there seemed to be no rallying place for our men, and we went from place to place, finding a few here and a few there. We managed to get some hot coffee and a bit of something to eat from some of the army officers, which was most acceptable, and we strolled to the rear of the camp which was protected by a stockade, behind which was a depression, and here we found quite a number of terrified women and children who had come up in the morning from Fortress Monroe to visit friends in camp, and as they could not get away they had been sent here during the engagement as the safest place.

It was now quite late in the day and finding ourselves quite adrift and not knowing what to do or where to go, Doctor Kershner, Pilot Smith and myself concluded that we would go down to Old Point and report ourselves to the senior officer at Hampton Roads, which of course was a very improper proceeding on our part as we should have remained at Newport News, but we were inexperienced and a good deal rattled by the events of the day, so off we started for a good ten-mile tramp along the shore. It was hard walking and we had to wade through a couple of small streams one of which was waist deep and the other deeper, which did not add to our comfort, and before our

journey was half over we were very tired. The doctor was completely done up, and we had to rest awhile on his account. He told us to go ahead and never mind him, but we would not do that but rested every now and then. After awhile we reached Hampton, Virginia, and went to the hospital there and got some good hot coffee and bread and butter which quite braced us up, and after a good rest and a smoke we set out again and reached Old Point at about ten o'clock at night, and went to Kimberly's store on the wharf, which stood about where the Hotel Chamberlin stood, where we were all well known and Mr. Kimberly took us in, gave us dry clothing and some supper and not only took care of us for the night, but supplied us afterwards with such money as we needed. Everybody who had been to Old Point knew Kimberly who had the only store there of any consequence, and supplied the ships with fresh provisions. There was great excitement at Old Point and as we were just from the scene of the engagement, we were objects of interest to many persons who wanted to learn the particulars about it. The quartermasters department of the army was busy sending steamers to the relief of the *Minnesota,* which was still aground, hoping to pull her off, but their efforts during the night were fruitless. We were told that the *Monitor* had arrived in Hampton Roads at nine o'clock that evening and had gone up to the *Minnesota,* but no one knew what she was or anything about her. We could see the light from the burning *Congress* over the point of land behind which lay Newport News, and a little after midnight she blew up in a spectacular manner, the fire having reached her magazines. This was certainly the most eventful day of my life, unless perhaps it was the day I left the *Oliver Putnam* in an open boat, during a storm in the Indian Ocean. It was the second time I had been obliged to abandon a sinking ship in a hurry, and with nothing but the clothes I stood in. Worn out with fatigue and excitement, I turned in a little after midnight and slept soundly until the morning. As I look back after the lapse of many years, I am surprised to find how little notice the navy department took of the gallant manner with which the *Cumberland* was fought in the face of such overwhelming odds. I cannot find among the official records of the navy department, published as *War Records,* that even a commendatory letter was written to Lieutenant Morris,

who commanded her in the memorable engagement with the *Merrimack*. There were no medals or thanks bestowed, which seems very remarkable compared with the Spanish-American war, after which medals were awarded for the most trivial engagements, and in some instances to ships which were not under fire. I cannot help thinking also of the cruelty of war.

Take for instance the case of the *Cumberland:* everyone on board knew from the moment she was rammed by the *Merrimack* that she would sink, and as the battle progressed it became more and more evident, and yet everyone was so intent upon fighting the enemy that no one, apparently, gave a thought to the great number of wounded men below the decks, and nothing was done to save them from the terrible fate which finally befell them when they were all drowned, for not one of them escaped. During the heat of the engagement no one would have thought of bringing them up from below and putting them, or some of them, into the boats, and in fact such a proceeding would have been impracticable while we were firing and under fire. The only way would have been to have ceased firing which meant to haul down our flag, which would have been equivalent to a surrender, which was something not to be thought of, and in consequence many wounded men were sacrificed to the horrible necessities of war.

THE "MERRIMACK" AND "MONITOR"

Sunday, March 9th, 1862. Notwithstanding the fatigue and excitement of the preceding day and the fact that I had but a few hours' sleep during the night, I was up bright and early the following morning and went down to the end of the wharf to look at the fleet then lying in Hampton Roads. The *Roanoke* and *St. Lawrence* were anchored between Fortress Monroe and the Rip Raps and there were several tugs, a few small gun boats, the *Cambridge, Mount Vernon, Mystic,* and the barque *Braziliera,* and a lot of army transports, both steamers and schooners, at anchor in various directions. The store ship *Brandywine,* a mastless hulk, was also at anchor in the Roads.

The *Minnesota* was still aground some seven miles above, and a large tug, the *Dragon,* and some quartermaster's steamers were trying to pull her off the bank on which she had grounded. The

Ericsson battery *Monitor* was near her, having reported alongside at 2 A. M. by order of Captain Marston, the senior naval officer present in the Roads, the commander-in-chief, Flag Officer Louis M. Goldsborough, commanding the North Atlantic blockading squadron, being then in the Sounds of North Carolina. The morning was mild and pleasant, with a slight haze which was dispelled as the sun got higher. There was scarcely any wind and the waters of the Roads were perfectly smooth.

After an early breakfast at Kimberly's, I went again to the wharf to wait until one of the *Roanoke's* boats should come in, and when one did come alongside a little later, I got a passage off to the ship in her and there reported to Captain Marston, my former captain on the *Cumberland,* who received me personally and congratulated me on my escape the day before and then asked me a number of questions regarding the battle, and as to affairs at Newport News. He overlooked the fact that I had left there without permission, and gave me authority to proceed home and report by letter to the navy department.

At about 8 A. M. the *Merrimack, Jamestown,* and *Patrick Henry* could be seen off Sewell's Point. At 8:45 A. M. the *Monitor* opened fire on the *Merrimack,* steaming slowly towards her. The *Merrimack* returned her fire, firing also at the *Minnesota,* and the two ironclads manœuvred about each other firing, sometimes at very close quarters, and then at longer range. Once the *Merrimack* succeeded in ramming the *Monitor,* striking her a glancing blow, but apparently doing her no material damage as she moved freely afterwards. Once the *Merrimack* got aground and backed her engines for fifteen minutes before she was again afloat. A shell from the *Merrimack* struck and blew up the boiler of the *Dragon* which was alongside of the *Minnesota.* The duel between the two ironclad vessels continued until noon, neither seeming to have gained any advantage over the other, though the withdrawal of the *Merrimack* early in the afternoon to Norfolk might be considered a victory for the *Monitor.* In this engagement, the *Monitor* was struck twenty-one times, viz.: pilot house twice; turret nine times; side armor eight times; deck three times. She expended forty-one solid cast-iron eleven-inch shot, and she was steered during the action by Quartermaster Peter Williams.

Commander John L. Worden, who commanded the *Monitor*, was injured in the eyes at 11:30 A. M. by the explosion of a shell from the *Merrimack* upon the outside of the sight hole in the pilot house, exactly opposite his eye, after which the vessel was in charge of her executive officer, Lieutenant S. Dana Greene. The *Monitor* carried two eleven-inch cast-iron smooth bore Dahlgren guns, which were muzzle loaders.

The *Merrimack's* battery consisted of two seven-inch and two six-inch Brooke rifles and six nine-inch smooth bore Dahlgren guns. While I was on board the *Roanoke*, a shot or shell from the *Merrimack* every now and then flew over the ship, and cut some of her rigging, and before she retired from the field it was thought she might make a dash into the Roads and try conclusions with the vessels there, and Captain Marston said to me, "It looks as if you might have another day of it." The *Minnesota* was struck a number of times and had three men killed and sixteen wounded and three men were wounded on the *Dragon* alongside of her. She fired a great many rounds at the enemy but apparently did her no damage. Her gunner reported ammunition expended as follows, viz.: 78 ten-inch shot; 67 ten-inch shell; 169 nine-inch shot; 180 nine-inch shell, and 35 eight-inch shell, a total of 529 rounds. Fearing that his vessel could not be got afloat Captain Van Brunt of the *Minnesota* had made preparations to abandon and destroy her, but the withdrawal of the enemy's vessels rendered such a course unnecessary. At two o'clock on the morning of Monday, March 10th, she was pulled off, having thrown overboard seven of her eight-inch spar-deck guns, and 150 of her crew were landed and in Fortress Monroe, according to the report of Colonel Wm. D. Whipple, assistant adjutant general. When afloat, the *Minnesota* proceeded to Hampton Roads and anchored there. Every one was jubilant when the *Merrimack* retired from the field though it was uncertain when she might return.

The *Minnesota* was undoubtedly saved from destruction by the presence of the shoal water around her, preventing the *Merrimack* from ramming her before the *Monitor* arrived. The arrival of the *Monitor* was most opportune, for had it not been for her presence the *Merrimack* could have made a clean sweep of every vessel in Hampton Roads.

Things soon quieted down on board the *Roanoke* and after lunch with the midshipmen I went on shore and as I was walking about I ran across one of the *Cumberland's* best men, Jerry Lamphry, who was the bo'sans mate of the gun deck, sitting on a pile of boards, "piping sweepers." He had strayed down to Old Point and had evidently had more grog than he was accustomed to. I knocked about until late in the afternoon and then took the Bay Line steamer for Baltimore.

Commander Worden of the *Monitor* was on board, being sent home for treatment, and he was accompanied by Commander Henry A. Wise, U. S. N.

While the battle between the *Merrimack* and *Monitor* was a notable affair it seemed tame enough to me as seen at a distance of three or four miles when compared with the stirring scenes and events of the preceding day. On Sunday morning, March 9th, the assistant secretary of the navy, Hon. G. V. Fox, arrived at Old Point having come from the capital as soon as the news was received there of the naval battle off Newport News. Before I left Old Point the store ship *Brandywine* was towed out by the *Mount Vernon*, which was to take her to Baltimore.

The appearance of the *Merrimack* created intense excitement throughout the North, especially in the seaports where there were grave apprehensions of a visit from this formidable craft which was credited with much greater scope of action than she really possessed, for the fact became known later that she could not safely venture outside the Capes of the Chesapeake, though within them she was a very formidable vessel against which we had nothing which could contend with any prospect of success except the little *Monitor*, so that any accident to the latter would be a national calamity. Had the *Monitor* had a fairly respectable armament she could easily have disposed of the *Merrimack*, but her two smooth bore eleven-inch guns of low velocity were of very little count even against thin armor of ordinary quality at short range.

I arrived at Baltimore early on Monday morning, March 10th, 1862, and took a train for New York where I arrived some time during the afternoon. I was a shabby-looking customer and no one seemed to care for my company, until an old gentleman who could not find a vacant seat in the car was obliged to share

mine with me. He looked at me once or twice and finally said, "Going home on leave, I suppose." This riled me and I said, "No, going home to get some clothes to wear so I can go back to duty again." This seemed to soften the old fellow who asked me several questions and finally I told him who I was and where I came from, which interested him very much, and as we proceeded on our journey he found opportunity to tell some of the other passengers, and before we reached New York I was quite a personage and a newspaper man urged me to go with him to the office of his paper, assuring me I would be well repaid for giving the version of an eye witness of the late battles, but I was not to be tempted and when we arrived in New York I got away from my new acquaintances and went to the Astor House to dinner, after which I had an hour or two to spare when I got a newspaper and read its version of the events I had witnessed and participated in, and in due time I took a night train for Boston and had the privilege of sitting up all night varied with some little sleep which I acquired in a very uncomfortable position curled up on an ordinary day car seat, with a billet of wood for a pillow which I took from the pile near the stove. It was rather cold and my feet felt several sizes too large for my boots, but morning came after what seemed a very long night, and we finally arrived in Boston and I made my way home to Roxbury, reaching there on Tuesday, March 11th, before breakfast, giving the family a surprise as they did not know what had become of me. I must have made a sorry figure in my gray soldier's coat and military cap, but that did not affect my welcome, and everything that could be done for my comfort and pleasure was done, and I was quite a hero among my old friends and neighbors. Before going on with my story this seems a suitable place to complete the history of the two vessels which had already become famous in history.

REAPPEARANCE OF THE "MERRIMACK"

During the battle between the *Merrimack* and *Monitor* the former was commanded by Lieutenant Catesby ap R. Jones, C. S. N., but after that she was placed in command of Flag Officer Josiah Tattnall, C. S. N., on March 25th, 1862, he being ordered to the defence of the waters of Virginia. The vessel which had been

lying at Norfolk since her engagement with the *Monitor* got under way on April 11th, 1862, and steamed down to Sewell's Point to within long range of the guns of the forts and ships at Old Point. She was accompanied by the *Jamestown* and some small gunboats. The *Jamestown* and *Raleigh* were sent to capture some merchant vessels which were at anchor inside of Hampton Bar, and they succeeded in bringing out the brig *Marcus* of Stockton, New Jersey, the brig *Saboah* of Providence, Rhode Island, and schooner *Catharine T. Dix* of Accomac, and these prizes were towed up to Norfolk, Virginia. The crews made no resistance and some of them escaped in small boats, but thirteen of them were captured. The *Merrimack* and her consorts then retired no demonstration against them having been made by the federal forces. She was made fast later to the buoy off Sewell's Point, and this was her last appearance. Various schemes for her capture or destruction, should she again appear, were made by our people and one or two large steamers were kept in readiness at Hampton Roads to run her down, should she again come out.

The easy victory of the *Merrimack* over the *Cumberland* and *Congress* startled the whole country. The secretary of the navy, Hon. Gideon Welles, relates what took place at a cabinet meeting called by President Lincoln immediately after the events at Hampton Roads and Newport News. "The *Merrimack*," said Stanton, "will change the whole character of the war: she will destroy seriatum every naval vessel. She will lay all the cities on the seaboard under contribution. I shall immediately recall Burnside: Port Royal must be abandoned. I will notify the governors and municipal authorities in the north to take instant measures to protect their harbors."

The *London Times*, after describing the battles, said, "Whereas we had available for immediate purposes 149 first-class warships, we have now but two, these two being the *Warrior* and her sister *Ironside*. There is not now a ship in the English navy apart from these two that it would not be madness to trust to an engagement with that little *Monitor*." That these views were exaggerated was shown in the near future when it became known that both the *Merrimack* and *Monitor* were deficient in seagoing qualities and could fight only in smooth water, but this fact was not then known.

DESTRUCTION OF THE "MERRIMACK"

On May 11th, 1862, at two minutes before five o'clock in the morning, the *Merrimack* blew up. She was set on fire by her own people at about three o'clock and her destruction was made the subject of a general court martial convened in Richmond, Virginia, on July 5th, 1862, to try Flag Officer Josiah Tattnall S. C. N. The court was composed of Captains Lawrence Rousseau, Franklin Buchanan, and Sidney S. Lee; Commanders Robert G. Robb, Murray Mason, Eben Farrand, A. B. Fairfax, M. F. Maury, and Robert B. Pegram. To this detail Captain George N. Hollins was subsequently added. Mr. Robert Ould was appointed judge advocate. The charges were: First. Culpable destruction of an armed steamer of the Confederate States navy. Second. Negligence. Third. Improvident conduct, to which the accused pleaded "Not Guilty." The trial lasted about twelve days and resulted in the honorable acquittal of Captain Tattnall.

HISTORY OF THE "MERRIMACK"

The steam frigate *Merrimack,* of 3,200 tons displacement, was one of a group of five vessels which were built about the year 1855.

The others were the *Minnesota, Colorado, Wabash,* and *Roanoke.* At the time they were built they were without exception the finest specimens of naval architecture afloat, and were much admired wherever they went. They were full ship-rigged, having auxiliary screw engines, and were designed to hoist their single screws when under sail. They had fine sailing qualities and when under a full spread of canvas presented an imposing appearance. The *Merrimack* was launched June 14th, 1855, at the Boston navy yard. Her hull cost $513,778 and her machinery, which was built under contract by R. P. Parrot at Cold Spring on the Hudson, cost $172,064, making the cost of hull and machinery $685,842. She was completed in February, 1856. Her length was 275 feet—beam thirty-eight feet six inches—and her draft when ready for sea was twenty-two feet eleven inches forward and twenty-four feet three inches aft. Her original battery consisted of fourteen eight-inch guns of sixty-three cwt., and two ten-inch pivots on the spar deck, and twenty-four nine-inch Dahl-

grens on the gun deck, all being cast iron, smooth bores. She was first commissioned at Boston on February 20th, 1856, under the command of Captain G. J. Pendergrast, and on April 19th when in the Severn River, below Annapolis, she was visited by the President, the secretary of the navy and a number of Congressmen. During this commission she visited Havana, Key West, Boston, New York, Southampton, Brest, Lisbon, Cadiz, Barbadoes, St. Thomas and Hampton Roads, and was put out of commission at Boston on April 22nd, 1857. She was re-commissioned at Boston on September 1st, 1857, under the command of Captain R. B. Hitchcock and for a few months was flag-ship of the Brazil station, flying the flag of Commodore J. C. Long. In January, 1858, she went round Cape Horn and became the flag-ship of the Pacific station, visiting Valparaiso, Pisco Bay, Callao, Payto, Panama, Honolulu, Acapulco and Realijo. On August 17th, 1859, Flag Officer Long was relieved by Flag Officer J. B. Montgomery, who on October 14th, 1859, shifted his flag to the *Levant*, the *Merrimack* being ordered home. She was at Rio de Janeiro on December 17th, 1859, in Hampton Roads February 4th, 1860, and was put out of commission at the Norfolk navy yard February 16th, 1860, and was there when the war broke out in 1861 and was burned and sunk by the Federal forces on Saturday, April 20th, 1861, and was raised by the insurgents May 30th, 1861, and was by them cut down and converted into an ironclad and was completed in March, 1862. On March 8th, 1862, she engaged and destroyed the *Cumberland* and *Congress* off Newport News, Virginia, and on March 9th, 1862, she fought the *Monitor* and retired to Norfolk, neither vessel having been defeated. On May 11th, 1862, she was set on fire and destroyed by her own officers and crew off Craney Island, just below Norfolk. Such is the brief history of one of the most notable vessels that was ever built. This vessel might have been saved to the Union if a little more nerve and decision had been displayed by the naval authorities at Norfolk and by the government at Washington.

The following extracts from *The History of the U. S. Navy Yard at Gosport, Virginia* (near Norfolk) by Commander Edward P. Lull, U. S. N., written in 1874, throw some light on the subject as he says: "She (the *Merrimack*) was reported ready to leave the navy yard, two days previous to her destruction, every

preparation having been made by Commander James Alden, even to engaging a pilot; the coal and the engineer's stores were on board and forty-four firemen and coal heavers had been engaged for the trip to Philadelphia. For some reason the necessary orders to depart were withheld by Commodore C. S. McCauley, the commandant of the navy yard, and two days later she, with the following vessels, were set on fire and scuttled by the Federal forces which were then in possession of Norfolk:

Ship of the Line *Pennsylvania*, 120 guns. Receiving Ship.
Ship of the Line *Columbus*, 74 guns. In ordinary.
Ship of the Line *Delaware*, 74 guns. In ordinary.
Ship of the Line, *New York*, 74 guns. On the stocks.
Frigate *United States*, 50 guns. In ordinary.
Frigate *Columbia*, 50 guns. In ordinary.
Frigate *Raritan*, 50 guns. In ordinary.
Sloop *Plymouth*, 22 guns. Ready for sea.
Sloop *Germantown*, 22 guns. Ready for sea.
Brig *Dolphin*, 4 guns. Ready for sea.

The U. S. S. *Cumberland*, twenty-four guns, the flag-ship of Flag Officer Pendergrast, commanding the home squadron, was lying off the Norfolk navy yard, fully manned. She had been under orders to proceed to Vera Cruz, but these orders had been countermanded. The navy department had ordered Commodore Hiram Paulding on April 18th, 1861, to proceed to Norfolk forthwith, to take command of all the naval forces there afloat, vesting him with full power to command the services of the entire naval force and directing him if necessary to repel force by force, in carrying out his instructions. The U. S. S. steam sloop *Pawnee*, Commander S. C. Rowan, then at Washington, was placed at his disposal and on April 19th, 1861, Commodore Paulding with the other officers detailed to assist him embarked on board of her, received one hundred marines from the Marine Barracks and proceeded to Fortress Monroe, where he arrived on the afternoon of the twentieth. Colonel Wardrop's regiment of Massachusetts volunteers were embarked and at 6:45 P. M. the *Pawnee's* head was turned towards Norfolk. At 8 P. M., April 20th, less than two hours after leaving Fortress Monroe, the *Pawnee* appeared in sight of the navy yard and ships and proceeded to the yard

where Commodore Paulding learned that he was too late: that the ships he had been sent to save were already rapidly sinking at their moorings. An examination was at once made to see whether it was possible to arrest the leaks and save the vessels, but it was found to be too late. The only alternative left to Commodore Paulding was to complete the destruction of the property as he had not the means at his disposal to defend it, nor was there any prospect of further aid from the government. It was imperatively necessary to send the *Pawnee* back for the defence of Washington. The *Cumberland* was a sailing vessel and was in a measure helpless and there was danger that the insurgents might barricade the channel below Norfolk and prevent her egress. Preparations were made for setting fire to the ships and the shops, and several barrels of powder were placed in one of the culverts of the dry-dock, everything being ready at 1:45 A. M. of Sunday, April 21st, 1861. At 2:25 A. M. the *Pawnee* left the wharf and passed hawsers to the *Cumberland* and at 4 A. M. the latter slipped her moorings, the tide then serving, and the two vessels, assisted by the chartered steamer *Yankee*, started down the river. The *Cumberland* and *Pawnee* picked up their boats and stood down for Hampton Roads, the former vessel hanging for some hours near Sewell's Point, having struck on the obstructions which had been placed in the channel, but was finally dragged off with the assistance of the chartered steamers *Keystone State* and *Yankee*. Within a month after the *Merrimack* had been burned and scuttled, she was raised by the Confederates. On April 25th, 1861, her battery was removed and despatched to Sewell's Point and other places for the defense of Norfolk, and the vessel was placed in the dry-dock, which had been repaired sufficiently to receive her. "The work of her transformation into the *Virginia* began immediately by cutting her down to her old berth deck to within three and a half feet of her light waterline. Both ends for seventy feet were covered over, and when the ship was in fighting trim were just awash.

"On the midship section, for a length of 170 feet was erected, at an angle of forty-five degrees, a roof of pitch pine and oak twenty-four inches thick, extending from the water line to a height over the gun deck of seven feet. Both ends of this structure were rounded, so that the pivot guns could be used as bow

and stern chasers and on the bows and quarters. Over the gun deck structure was a light grating, making a promenade about twenty feet wide and nearly 170 long. The iron plating which covered the wood backing was rolled at the Tredegar Iron Works at Richmond and was two inches thick. The under layer being placed horizontally, and the upper laid up and down, the two being four inches thick, were bolted through the wood and clinched inside.

"The *Virginia* thus armored was further provided with a cast-iron prow or ram which projected four feet, but it was imperfectly secured as the test of battle proved. Another defect was the unprotected condition of the rudder and propeller. The pilot house was forward of the smokestack, and was covered with the same thickness of armor as the casemate. The motive power of the old *Merrimack* propelled the new *Virginia,* but it was so radically defective that both engines and boilers had been condemned during the last cruise of the *Merrimack.* The armament of the *Virginia* consisted of two seven-inch rifle guns, heavily reinforced around the breech with three-inch steel hoops, shrunk on. They were the first heavy guns so made in this country, and were the work of Lieutenant Brooke, C. S. N., and these guns formed the bow and stern chasers of the battery; there were also two six-inch guns of the same make, and six nine-inch smooth bores in broadside, making ten guns in all." (The above is from Sharf's *History of the Confederate Navy,* pp. 152 and 153.)

HISTORY OF THE "MONITOR"

The U. S. S. *Monitor* was built under contract with John Ericsson for the sum of $275,000. Her keel was laid in the shipyard of Thomas F. Rowland at Greenpoint, Brooklyn, in October, 1861, and she was launched on January 30th, 1862. On February 25th, 1862, she was commissioned and turned over to the government, and nine days later she left New York for Hampton Roads.

The following is an extract from *Battles and Leaders of the Civil War,* page 719. "The length of the *Monitor* was 179 feet, beam forty-one feet six inches: tonnage 776: armament two eleven-inch Dahlgren guns.

"The crew was composed of volunteers, Lieutenant Worden having been authorized by the navy department to select his men from any ship of war in New York harbor, addressed the crews of the *North Carolina* and *Sabine*, stating fully to them the probable dangers of the passage to Hampton Roads, and the certainty of having important service to perform after arriving. The sailors responded enthusiastically, many more volunteering than were required." Her appearance in Hampton Roads and the services rendered by her in those waters have already been described. She remained in that vicinity a little over nine months and then was ordered to Charleston, S. C., and was taken in tow by the U. S. S. *Rhode Island* and when twenty miles S. S. W. of Cape Hatteras on December 31st, 1862, she foundered, being under the command of Commander Bankhead. She took in water around her turret and probably sprung a leak as well. Occasional comments appearing in the newspapers, intimating that there had been opposition on the part of naval officers to the building of the *Monitor*, induced me to write the following article.

Navy Department,
Bureau of Ordnance,
Washington, D. C.
March 14, 1901.

To the Editor of the *Army and Navy Journal.*

Sir:

It is not infrequently stated that there was much opposition on the part of naval officers to the building of the original *Monitor*, and it has even been stated that it was only accomplished by the direct intervention of the President.

That such was not the case appears in Senate Document No. 86, 2nd Session, 40th Congress, entitled "Letter of the Secretary of the Navy, communicating in compliance with a resolution of the Senate of the 24th inst. (July, 1868) information in relation to the construction of the iron-clad *Monitor*."

As nearly forty years have elapsed since the inception and construction of this remarkable vessel, it may be of interest to many of your readers to learn the true facts of the case, which are taken from the official document above referred to.

At the extra session of Congress, which convened on the 4th of July, 1861, pursuant to the proclamation of President Lincoln, a report was submitted by Hon. Gideon Welles, secretary of the navy, in which he adverted to the fact that other governments were constructing armored

vessels, and he recommended that initiatory measures should be taken by our government for the construction of "one or more iron-clad steamers or floating batteries."

Congress responded promptly and liberally to this recommendation, and on August 3rd, 1861, passed an act authorizing and directing the secretary of the navy to appoint a board of three skilful naval officers to investigate the plans and specifications that might be submitted for the construction or completing of iron- or steel-clad steamships or steam batteries, and appropriating the sum of $1,500,000 for the construction of one or more of the same, should the plans be approved.

On August 7th, four days after the passage of the above act, the navy department issued an advertisement "for the construction of one or more iron-clad steam vessels of war, either of iron or of wood and iron combined, for sea or river service, to be of not less than ten nor more than sixteen feet draft of water: to carry an armament of from eighty to one hundred and twenty tons weight, with provisions and stores for from one hundred and sixty-five to three hundred persons, according to armament, for sixty days, with coal for eight days. . . . The vessels to be rigged with two masts with iron rope standing rigging, to navigate at sea.

"Propositions to be received for twenty-five days."

From the above it will appear that the navy department lost no time in carrying out the provisions of the act of Congress above referred to.

On the following day (August 8th, 1861) the secretary of the navy appointed a board of three distinguished officers to investigate such plans as might be submitted. This board was composed of Commodore Joseph Smith, Commodore Hiram Paulding, and Captain Charles H. Davis.

The secretary of the navy visited Connecticut early in the month of September, 1861, and while at Hartford, C. S. Bushnell, Esq., of New Haven brought to him the plans of the original *Monitor* designed by Captain John Ericsson of New York. It received the instant favorable approval of the secretary, who requested Mr. Bushnell to proceed to Washington without delay and submit it to the board then about to decide on the plans presented. He was assured that in case of unavoidable delay beyond the time limited for receiving proposals, an exception should be made in favor of this novel invention of a submerged vessel with a revolving turret, and that it should be embraced among the plans on which the opinion of the board would be required. In compliance with the suggestion made at the interview in Hartford, Mr. Bushnell proceeded to Washington and exhibited his plans to the board. On September 16th, 1861, the board submitted its report which embraced the plans presented by seventeen bidders.

Three propositions were favorably considered, namely, those of John Ericsson of New York, C. S. Bushnell of New Haven, and Merrick and Sons of Philadelphia. With regard to Ericsson's design the board remarks: "This plan of a floating battery is novel, but seems to be based upon a plan which will render the battery shot- and shell-proof. We are somewhat

apprehensive that her properties for sea are not such as a seagoing vessel should possess, but she may be moved from one place to another on the coast, in smooth water. We recommend that an experiment be made with one battery of this description on the terms proposed, with a guarantee and forfeiture in case of failure in any of the properties and points of the vessel as proposed."

Price $275,000; length of vessel 172 feet; breadth of beam forty-one feet; depth of hold eleven feet six inches; time 100 days; draft of water ten feet; displacement 1,255 tons; speed per hour nine statute miles. On October 4th, 1861, the navy department entered into contract with Mr. Ericsson for a vessel on his plan, which was described as "an iron-clad, shot-proof steam battery of iron and wood combined." Payments were made as the work on the vessel progressed, there being five payments of $50,000 each and one of $25,000, each with a reservation of twenty-five per cent; the reservations amounting to $68,750 being paid on March 14th, 1862.

The *Monitor* left New York for Hampton Roads on March 6th, 1862, reaching the latter place on March 8th, and on the following day (the 9th) she had her memorable encounter with the Confederate iron-clad *Merrimack*. About this time erroneous statements were current that "certain parties built the *Monitor* at their own risk, having agreed not to call upon the government for remuneration until the vessel had been tested in action. Strong in faith, receiving but a negative support from the navy department, they completed the *Monitor* at their own cost," and an affirmation was made on the floor of the House of Representatives that "a member from New York advanced the money and paid the entire expenses out of his own funds, in order to get the *Monitor* built, which met the *Merrimack* in Hampton Roads." Whereas in point of fact, the money which was applied to build the *Monitor* was appropriated by Congress on the recommendation of the secretary of the navy in August, 1861. The plan of the *Monitor* was submitted to him as above stated in the early part of September, 1861, and was sent by him at once to the board which he had appointed, was favorably reported upon by that board and a contract for its construction was entered into immediately. Although the department received but little encouragement from any quarter in regard to this novel experiment, its confidence in her success was unshaken. After the wonderful achievement of the *Monitor*, the tone of many was changed, and there were then persistent efforts to deny the department any credit for the adoption or construction of the *Monitor*. These misrepresentations led the inventor, Mr. Ericsson, to write the following letter which constitutes a part of the history, called for in the resolution of the Senate.

New York, April 25th, 1862.

"Sir:

"In your remarks on the administration of the navy department in today's *Herald* you have inadvertently done the secretary of the navy great

injustice relative to the construction of the *Monitor*. A more prompt and spirited action is probably not on record in a similar case than that of the navy department as regards the *Monitor*. The committee of naval commanders appointed by the secretary to decide on the plans of gunboats laid before the department occupied me less than two hours in explaining my new system. In about two hours more the committee had come to a decision. After their favorable report had been made to the secretary, I was called into his office, where I was detained less than five minutes. In order not to lose any time, the secretary ordered me to 'go ahead at once.' Consequently, while the clerks of the department were engaged in drawing up the formal contract, the iron which now forms the keel plate of the *Monitor* was drawn through the rolling mill.

"I am, respectfully, your obedient servant,

J. ERICSSON.

To James Gordon Bennett, Esq.

Hon. Gideon Welles, then secretary of the navy, in submitting the foregoing to the president of the senate, says:

"To the distinguished inventor of this new-class vessel, to his sureties, to the board of naval officers who reported in her favor, to the vigilant and very able naval officer who superintended her construction, the secretary has on repeated occasions tendered his obligations and his thanks for their patriotic services in coming to the assistance of the department and the government in a great emergency.

"Great praise and commendation are due to them respectively, but no one can be justified in attempting to arrogate to himself undue merit at the expense of the others.

"Under misapprehensions and misstatements that have been made in regard to this vessel, it is proper that the real facts should be made public, and the department has gladly embraced the opportunity in communicating the official documents, records, and facts connected with the construction of the ironclad *Monitor*."

From the foregoing it will appear that instead of opposition on the part of the navy department or officers of the navy to the building of the *Monitor*, the scheme received their hearty approval and co-operation. It is possible and probable that the proposed vessel did not commend itself to all the officers of the navy, but it is quite evident from the above that no serious opposition manifested itself, notwithstanding frequent assertions to the contrary.

Respectfully,

CHARLES O'NEIL, *Rear Admiral, U. S. Navy.*

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

INTRODUCTION

The author of this article, Lieutenant Commander Fedotov, was, in 1914, at the outbreak of the world war, attached to the imperial Russian embassy in Washington, D. C., as assistant naval attaché. He returned to Russia and was assigned to duty in the Baltic fleet, where, at the time of the revolution in March, 1917, he was in command of a destroyer. His ship took part in a number of mine-laying expeditions off German ports and was in several engagements with enemy light forces.

In May, 1917, Lieutenant Fedotov was detailed as naval aide to the special diplomatic mission of the United States of America to Russia, headed by Senator Elihu Root. He accompanied the naval member, Rear Admiral James H. Glennon, U. S. N., with his staff, to all the naval ports of Russia, including Archangel, Sevastopol, and Baltic Sea bases.

In November, 1917, when the Bolsheviki overthrew the provisional government in Russia, Lieutenant Fedotov went to England and was enrolled in the naval reserves with rank of lieutenant. He was given command of a ship and took an active part in the British operations at Archangel, where he was so seriously shell-shocked that he was retired from active service and decorated with the Distinguished Service Cross.

Upon recovering from his wounds, he made his way to Siberia and commanded a battalion of marines in the army of Admiral Kolchak, where his troops engaged in all the operations against the Bolsheviki until the Kolchak government collapsed.

Mr. Fedotov went from Irkutsk to Moscow where he lived under an assumed name until recently, when he managed to leave Russia and came to the United States via England. While in England he arranged for the publication of a series of articles in several British periodicals.

THE RUSSIAN NAVY AND THE REVOLUTION

By Dimitri Fedotov, ex-Lieutenant Commander, Imperial Russian Navy

"The inveterate habit of insubordination of the seamen of the Western Ports, reduced almost to naught all the efforts of the Naval Commissioners."

—*Najac Lettres de l'Ordonnateur de la Marine*, France, 1798.

The First Days of the Revolution in the Navy

At the outbreak of the March revolution in 1917, the attitude towards it of all the Russian navy, with the exception of divisions and ships stationed at Kronstadt, was one of cautious expectation. Neither in Reval nor in Helsingfors nor in Sevastopol, was there any organized revolutionary action. In Petrograd the second naval division vigorously resisted the revolutionary units of the Guards Infantry Depots, and at Tsarskoe Selo the naval guards battalion protected the imperial family from the outrages of the revolted soldiers of the Guards Rifles' Depot. It was only at Kronstadt that a bloody insurrection of the shore detachments culminated in the murder of the energetic Admiral Viren, who had distinguished himself at Port Arthur, and of a number of naval officers. In all the other ports the change of authorities took place peacefully, and almost everywhere on the initiative and under the direction of the officers in command, who recognized the provisional government as the lawful power in the country. Admiral Kolchak in Sevastopol and Admiral Nepenin in Helsingfors had succeeded, it seemed, in averting a mutiny.

However, the flame of the seamen's insurrection was rapidly transmitted from Kronstadt to Helsingfors, to which result much was contributed by the wireless messages sent by the leaders of the Kronstadt rebellion. The commander-in-chief and the officers of the squadron stationed at Helsingfors had already recognized the revolutionary government when that cruel and aimless outburst arose on the battleships *Emperor Paul* and *Andrey Pervozvanny*, the victims of which were Admirals Nepenin and Nebolsin, and scores of naval officers. This outburst destroyed every chance of preserving discipline in the Baltic fleet, all the more so that the provisional government did not even attempt to punish the murderers, although their victims had been agents of

this very government, recognized by them. In Reval there were no tragic events, but what had happened in Kronstadt and Helsingfors could not fail to leave a strong impression on the crews of the ships stationed there—the impunity of the Helsingfors murderers was a fatal blow to discipline, and an abyss that could not be bridged was opened between the officers and the men. In the Black Sea fleet things went on somewhat better, and Admiral Kolchak was able for several months to keep his men within the limits of discipline. But even here relations between officers and men were steadily becoming anomalous and the ship organization was gradually disintegrating.

The outrages committed in the Russian navy in the course of the revolution are widely known, but the causes which led to these outrages on board ships and in the naval barracks *after* the revolution had been accomplished, and consequently without any political reason, have hardly been investigated. The current explanation is that the massacres came as a result of the alleged cruelty of the officers towards the men, and of the great material hardships under which the crews had had to live.

The author of the present sketch was, at the outbreak of the revolution, commanding officer of a destroyer in Reval, and had in the course of the first few weeks following ample opportunities of conversing with some of the most revolutionary elements among the seamen and of discussing with them the events in Kronstadt and Helsingfors. Besides his personal observations, the author, who was editor of the *Navy Review (Morskoy Sbornik)* of Petrograd for several months in 1917, has collected numerous letters of officers from Helsingfors and Kronstadt, articles from the seamen's revolutionary press, and accounts of meetings held by naval units in various ports, as well as reports of members of the Duma, who were sent to investigate the situation on the ships of the Baltic fleet in March, 1917.

The study of this extensive material and a comparison with similar facts which took place in the French navy during the great revolution, in the British navy at the close of the eighteenth century, and in the German navy immediately before the armistice—have brought the author to the following conclusions as to the origin of the tragic collisions between the officers and the men

of the Baltic fleet. The causes which led to them may be brought under three principal headings:

(1) Causes originating in the conditions of service in a navy in general, irrespective of its nationality.

(2) Causes originating in the peculiarities of the regulations and of the organization of service on board and on shore in the Russian navy.

(3) Causes not depending on the conditions of naval service.

The author has endeavored impartially, *sine ira et studio,* to investigate the causes belonging to each of these three categories and to ascertain their relative importance in producing among the seamen that state of mind which manifested itself in those fatal days of March, 1917. We are not yet sufficiently removed in time from these events to be able to see them in their true historical perspective. Besides, some degree of subjectivity in the evaluation of one or another of these causes can hardly be avoided. Nevertheless, the author will try to expound his argument so as to enable the reader to form his own opinion of the meaning and the fundamental causes of the outrages committed by Russian crews in the course of the first few weeks of the "bloodless revolution," and to arrive at his own conclusions with a more or less complete knowledge of facts, even if these conclusions will differ from those of the author, who has no axe to grind and is only anxious to discover the truth.

First Category. On board ship, in all navies, officers and men are cooped up in the comparatively narrow spaces between the decks. The seamen have every day the opportunity of observing that the officers are placed in far better material conditions than the enlisted men. Better food, comfortable cabins, the possibility of going on shore in civil dress, etc., all this rouses a feeling of envy among the less favorably placed men. Even insignificant offences are severely punished by the naval regulations. Things that would have remained unpunished on shore, afloat may lead to imprisonment or limitation of shore-leave. The punished man, even if deservedly punished, thinks that he is suffering by the fault of the lieutenant of the watch, or any other officer who happened to notice his offence, and by that of the captain or of the court martial (consisting also of officers) by whom the punishment was awarded. Thus a certain number of seamen, especially

those whose conduct is not beyond reproach, acquire the habit of contrasting in their minds the officers to the men, as oppressors and oppressed.

As it is impossible to avoid on board ship a constant intercourse between both parties, the recollection of a punishment awarded by the initiative of such and such an officer becomes effaced from the mind of the punished with much more difficulty than in other conditions. Again, officers are recruited among the sons of comparatively well-to-do families of the upper and middle classes, whereas the men are, for the most part, sons of factory workmen or of the poorer rural classes, except those who come from families of fishermen or sailors of the commercial fleet. In our days of class hatred, young men entering the navy often bring from their homes a developed class-consciousness and hatred of the bourgeois, and are prepared to regard the officers as the agents of a hated class. This is especially the case in those navies where recruiting is by conscription, as, for example, in the Russian and German navies, and only in a much smaller degree in those where enlistment is voluntary, as in the navies of the United States and Great Britain.

The material conditions of human existence on board ship are very different from those on shore. The men are heaped together in common dormitories between the decks. They have no privacy. They have no corner they can call their own. They pass the whole day under the eyes of hundreds of other men, and at night they sleep in hammocks. The crews of warships generally receive food which is rich in nitrogenic substances, and at the same time they are often unable to have sufficient exercise. Abundant nourishment with little exercise makes for neurasthenia and general unbalancement of the mind. These causes are especially powerful over those seamen whose specialty demands no expense of physical activity, such as wireless telegraphists, electricians, clerks, etc. Life on board ship is under the constant influence of electric fields. Cats, on some ships, cannot hold out for more than a few weeks: man is less sensitive to the action of electricity, but still its effect must be reckoned with. On board great modern battleships, protected by several belts of armor, part of the crew has to live in spaces never entered by the light of day and where air is introduced by pressure ventilators.

At last, the men have little hope ever to obtain a commission, although in most navies (including the Russian pre-revolutionary navy) this was in theory possible.

All these conditions exist in all navies, but naturally their importance varies according to differences of race, education, organization of service, discipline, food, climate, and to the degree of comfort in which the crews are placed. They are, however, inherent to every navy and contribute to make seamen dissatisfied and unbalanced, especially on long passages or when conditions are such as not to permit frequent shore-leave.

Second Category. Before the war the Russian navy was traversing a period of transition in the organization of ship service and in the training of recruits, a period that began soon after the Japanese war. Most of the innovations were being introduced on the initiative of a group of energetic and comparatively young officers who had taken part in the Japanese war. Admiral N. O. Essen was at the head of the movement. Owing to their efforts, discipline, which had been greatly undermined in the years immediately following the Peace of Portsmouth, had not only recovered, but now attained a standard hitherto unknown in the Russian navy. Unhappily, the sound principles that were being inculcated by these officers had not yet found their way into the naval regulations, and this somewhat unsystematic collection of rules relating to ship-service had not yet been replaced by a new regulation, better answering to modern exigencies. Consequently, most war ships regulated their service on board by various instructions and rules drawn up by their respective captains and commanders. The spirit of such instructions was the same in all the navy, but there was no absolute uniformity, and this favored the impression that the regulations was one thing and service on a modern warship quite another thing, and that the two had little in common. This could not fail to undermine all respect of the regulations, among the younger officers as well as among the more intelligent and forward seamen.

Besides, the "regulations on discipline and punishments for the breach thereof" in force in the Russion navy were decidedly out of date, and were based on wrong principles. Thus, on a Russian warship, every officer had the right to award summary punishment to every man of the crew. The degree of punishment alone

depended on the rank of the officer. This was conducive of inequality in punishments on board the same ship for the same offence, and the men became accustomed to consider the officers' actions as arbitrary. It is, moreover, to be regretted that the captains of some ships delegated their power of awarding punishments to the commander, sometimes even to section commanding officers. Attempts to regulate this anomalous state of affairs were made on the best disciplined ship (e. g., on the cruiser *Bogatyr*) and took the form of an unofficial modification of the statutory order of awarding punishment, so as to concentrate all the power of awarding summary punishment with the captain, or the commander. The other officers had only the right to establish the fact of an offence and to enter it in the punishment record, but could not themselves award any punishment. Besides, as on board some ships officers remained for fairly long periods of time (six or seven years sometimes) different conditions of service and discipline were gradually developed on different ships. Some ships were very "severe," others were "slack." This was favored by the tendency of the captains to introduce individual features on board the ships they commanded, a tendency strengthened by the superannuated character of the naval regulations and of the regulations on discipline.

All this lack of system in awarding punishment (some of which were rightly felt as degrading, e. g., standing on the quarter deck—others as unnecessarily cruel, e. g., the reiterated forfeiture of shore-leave during a month), tended to irritate the crews, who came to regard the officers as petty tyrants, who punished according to their moods or their personal ideas on discipline, not according to a law common to all the navy. The comparatively infrequent cases of blows being inflicted by officers (this was strictly condemned by the regulations) always became known to all the crews of a squadron and were magnified by rumor.

The crews of the Russian navy were recruited *by conscription* from the working and peasant classes. The term of service was long—five years; in the infantry it was only three years. The number of re-engaged non-commissioned officers was not sufficient, and they were not always the best element from a moral standpoint. Many of the re-engaged were men who lacked initia-

tive and ability, and did not hope to make their way through life on shore. The re-engaged non-commissioned officers had little authority with the men.

The men entered by conscription were of various descriptions. The recruits differed one from another in their social standing as well as in their intellectual development. Some of them were semi-educated young men of the working class, who had read many books and had ideas on Karl Marx and his theory, others were illiterate peasant boys from the backwoods of Archangel who had never seen a brick house or a railway engine, who had not even suspected the existence of such a thing as the Russian navy, and of course could not understand what it was wanted for. This heterogeneous mass of recruits was incompletely hammered together in the course of a six-months' drill on shore by very primitive methods, which were not out of place only in regard to their least civilized elements. The better educated young men left the depot with the one conviction that all this drilling had been aimless and meaningless.

As a class of commercial sailors as it exists, e. g., in France and England, is practically non-existent in Russia—the great majority of recruits, when once on board, found themselves in completely alien and unfamiliar surroundings. A current Russian phrase about a recruit was that he had been "taken from the plough," i. e., had never seen the sea and was quite a stranger to it. The seamen never felt themselves at home at sea, and only dreamt of returning as soon as possible to their villages.

The officers of the Russian navy were, up to the very last years before the war, taken exclusively from the class of hereditary nobles. Even after this rule was abrogated, although young men of non-noble families were admitted to the Naval Academy, they remained an infinitesimal minority. The Russian peasant was accustomed to think of all nobles as squires, and the ill-feeling he might have developed toward the landlord at home he extended to the officers on board, although the majority of naval officers possessed no land, belonging to families who had served in the navy for generation after generation, poor for the most part, and existing exclusively on their pay.

On most ships the men might receive shore-leave only on Sunday afternoons, for a few hours only, and in rotation, so that only

a quarter of the crew were allowed shore-leave at a time, and a seaman came on shore only on an average of once a month for a few hours. This was obviously insufficient, and in the course of the war shore-leave came to be given every day as far as conditions permitted. But until the very outbreak of the revolution, shore-leave was accompanied with difficulties and useless formalities.

On shore seamen were forbidden to smoke in the streets and public places, to enter restaurants and public houses, to go to theaters, except they sat in the gallery. They were also forbidden the entrance of divers public gardens and boulevards (e. g., in Sevastopol) and this could not fail to irritate their sense of dignity.

During the war this feeling of offended dignity was strengthened by the fact that in the army, where the loss in officers was immense, every half-educated soldier could hope to receive a commission after a short term of training in the School of Ensigns —and at the same time non-commissioned officers of the navy, who were perfectly qualified technicians, remained simple men and were obliged to salute their more successful comrades who served in the army; they saw that these had now the same privileges as officers of noble birth while they themselves had no hope of promotion.

The mobilization at the outbreak of the war brought back reservists who had served from 1904 to 1907, men who remembered the old days of loose discipline and were quite unprepared to serve under the new and severer order which had been established by 1914. They were naturally much annoyed by the new conditions, and did not readily submit to discipline. At the outbreak of the war I was commanding a section on board the cruiser *Russia*. Before the arrival of the reservists the average of summary punishments seldom surpassed three or four per month, with 180 men in the section. After the entry of sixty reservists the number of punishments immediately rose to twenty-five or thirty monthly.

It is, at last, important to remember that the officers of the Russian navy, like all the Russian educated classes, were separated from the people and did not understand their mentality, though perhaps the naval officers stood nearer the man of the

people and understood him better than any other class of *intelligentsia.*

After all this enumeration of the peculiarities of Russian naval life the reader will be, perhaps, at a loss to understand how it was that the Russian navy, and especially the Baltic fleet, showed such efficiency and such fitness to win. This may be explained only by the superior moral and intellectual qualities of the individual officers who worked with complete self-abnegation, Admiral N. O. Essen at their head. They succeeded in obtaining good results, not owing to the surrounding conditions, but in spite of them. Numerous foreign missions (including the American naval mission under Rear Admiral Glennon, U. S. N.), were able to see with their own eyes that since the Japanese war the Russian navy had changed for the better so as to be almost unrecognizable; it was only the revolution that greatly lowered its fighting qualities (Oesel operation, 1917).

Third Category. The Russian navy early became a favorite field of revolutionary propaganda. The guards' naval division was among the most active participators in the Dekabrist rebellion of 1825. A number of pupils of the Naval Academy also took an active part in it, and in consequence Emperor Nicholas I deprived the academy of the appellation of "Emperor's Own," which it had hitherto shared with the *Çorps des Pages.*

In the second half of the nineteenth century the *Narodnaya Volya* (People's Will) party tried their best to spread their ideas among the officers of the navy and the cadets of the Naval Academy. An association was formed to this end, under the name of Whalers' Society, which tried to attract young men ostensibly for the purpose of forwarding Russia's sea fisheries. Of the revolutionary officers of the navy the greatest notoriety was acquired by Lieutenant Sukhanov, who was subsequently sentenced to death.

In the revolution of 1905, Lieutenant Schmitt, the figurehead of the seamen's rebellion in Sevastopol, and Lieutenant Nikitenko, a member of the terrorist section of the Social Revolutionary party, died by the hand of the executioner. In 1917 Midshipman Ilyn (Raskolnikov) and Ensign Garfield, both members of the Communist party, played a prominent part in the revolution. Be-

sides these, several naval officers were members of the Social Revolutionary and Social Democrat parties.

But all these instances are not typical of the Russian naval officers' milieu. The overwhelming majority were not at all interested in politics and regarded the revolutionary outbursts in the navy as mere mutinies. Only a small minority were actively reactionary.

But in the last few months of 1916 a change came over the attitude of the naval officers. The murder of Rasputin, the speeches of Purishkevich and Molynkov, compelled most of them to start thinking on the political situation in Russia, and undermined their former conviction that autocracy was the form of government which answered to the cultural and economical level of the Russian people. But from this change of attitude to active sympathy with the revolution the distance was great. A parliamentary monarchy was, to the majority, the extreme limit of aspirations and probabilities.

But among the seamen revolutionary propaganda had been far more successful. The Social Revolutionary party was especially popular, sparing, as it did, no effort to create revolutionary associations on the warships. The Bolshevik party had also their organizations in the navy, but they were far less numerous and influential than those of the Social Revolutionary party.

Ever since 1905 a series of mutinies and rebellions had taken place in the navy; they were purely revolutionary in character, although sometimes, for motives of expediency, their leaders gave them the shape of economical dissatisfaction (dissatisfaction with food, pay, etc.). The best known are: the bloody mutiny of the battleship *Prince Potemkin*, the Sevastopol rebellion headed by Lieutenant Schmitt, the mutiny on board the cruiser *Pamiat Azova* in 1906, and the seamen's rebellion in Kronstadt in 1905. Besides these, some disorders would break out nearly every year in the Baltic as well as in the Black Sea fleet, and several ships became notorious for their revolutionary proclivities, while others remained staunchly loyal. The torpedo boats and in general the smaller craft were loyal, while the battleships, especially the new ones, were inclined to mutiny.

The putting down of all these rebellions involved the execution of ringleaders, and the revolutionaries were not slow to spread

rumors of executions en masse and of wholesale annihilations of rebellious crews. These rumors had no foundation whatever. The government applied capital punishment only to the leaders and to men guilty of murder. The total number of men executed is nearer a few dozens than many thousands, as it was asserted by the propagandists. In some cases (e.g., the mutiny on the battleship *Emperor Paul I*) the Emperor substituted penal servitude for capital punishment to all the men sentenced by the court martial. In the years immediately preceding the war, the government succeeded in expelling the revolutionary associations from the ships, and by the autumn of 1914 only wretched remains of the terroristic and fighting associations of the Social Revolutionary party were left here and there.

The upheaval of patriotic feeling which accompanied the outbreak of the great war contributed to the establishment of an informal armistice between the government and the revolutionary parties. During the first two and one-half years of the war, there were only two cases of disorder in the navy. The first took place on board the cruiser *Rossia* in the summer of 1915 and only proved the weakness of the revolutionaries who were backed only by the reservists. The second was on board the battleship *Gangut* whose captain was Captain M. Kedrov, an officer of outstanding merit, while the commander was another excellent officer—Commander M. Petrov. This outburst was more serious than the preceding one, but it also ended without bloodshed, owing to the energetic measures taken by the senior officers and the obvious lack of sympathy with the rebels of the majority of the men. But in 1917 the men had become weary of the war; especially those whose term of service should have ended in 1914, and who were now eight years away from their homes and families.

The German general staff was interested in the weakening of the Russian Baltic fleet and spared no efforts to foster the discontent of the men on board. Their opportunities were especially favorable in Helsingfors where not only the sympathies of the Finnish bourgeoisie were on their side, but where German agents could find active help from the Finnish groups who were trying to liberate their country from Russian domination and saw in Germany a powerful ally in their struggle for independence. This

explains the formation of Finnish volunteer *Jagär-battalions* who fought on the German side.

No documents have as yet been published in Germany that might throw light on the activity of the agents of the German general staff in Finland and Kronstadt, but there is no doubt that large sums were expended and that an active propaganda was carried on among the sailors.

The crews and the shore units stationed at Kronstadt owing to their composition (large percentage of reservists of old terms, and, in the naval divisions, a considerable number of seamen taken off their ships for bad conduct), as well as to the proximity of Petrograd with its hundreds of thousands of factory workmen, were under the action of Bolshevik propaganda, more than any other part of the navy. The influence of Bolshevism over the minds of the Petrograd workmen was on the increase since the beginning of the war. The Bolsheviks had a strong organization in Kronstadt and it was popular with the seamen.

In combating the revolutionary movement in the navy the government had, previously to the war, arrived at the idea that much would be gained by handing over the whole proposition to the political secret police and the gendarmes' corps. Secret agents were introduced on board and in the barracks and started their secret work, acting independently of the commanding officers and obeying only the orders of their own superiors. Unhappily the agents of the Russian home office were prone to recur to methods known by the name "provocation" and used to support one revolutionary party against another. The Bolsheviks enjoyed their special protection and, consequently, relative immunity. In the winter of 1916-1917 the revolutionaries developed an intense activity among the workmen of Petrograd, preparing an armed insurrection. This activity found an immediate echo in Kronstadt where the revolutionary spirit rapidly grew. Admiral Viren, the commandant of Kronstadt, was known to be a man of strong will and unbending loyalty to the sovereign. The remains of the social revolutionary associations on the ships stationed at Helsingfors (especially the battleships *Paul I* and *Andrey Pervozvanny*) also began to stir.

Thus by the end of February, 1917, the attitude of the officers of the navy may be qualified as moderately conservative, with a

shade of grumbling against a weak and inefficient government. The more advanced proletarian elements of the men were strongly revolutionary. The contrast between the two attitudes was especially sharp in Kronstadt, which was ruled by the heavy hand of Admiral Viren, and in Helsingfors, where Admiral Nepenin was also not of very soft disposition and was considered a reactionary.

In the Black Sea fleet, remote as it was from the centers of German propaganda as well as from the centers of industry, the men were far more quiet, and the commander-in-chief, Vice-Admiral Kolchak, was known to be a man of moderately liberal views. The contrast which existed in the Baltic fleet between the political ideas of the commanding officers and those of the more advanced men, was there absent.

The revolt in Kronstadt broke out almost simultaneously with that of the guards' depot in Petrograd. Its first victims were Admiral Viren and Rear Admiral Alexander Butakov. Viren's corpse was soaked in petrol and burned on the Anchor Square. The revolution took its revenge on autocracy in the person of the commandant of Kronstadt and the scum of the seamen's mob triumphed their victory over the stern commander who had upheld a discipline of iron in his command. The other senior officers were all massacred and together with them a few more or less casual victims from among the junior officers. The massacre was carried out according to a list drawn up beforehand, and was not the outcome of personal vengeance on the part of individual seamen. The Bolsheviks from the very beginning succeeded in establishing their authority and until the October revolution made them rulers of all Russia, Kronstadt was their stronghold and their sanctuary, where the agents of the impotent provisional government were afraid of pursuing them.

The Kronstadt massacres were a phase in the process of throwing down the old régime, and from the revolutionary point of view they had a political *raison d' être,* destroying as they did, opponents with whom no compromise was thought possible. The events in Helsingfors were of a totally different nature. Here the revolutionary associations were much weaker, and the moods of Petrograd were much less rapidly and strongly reflected in the minds of the seamen than was the case in Kronstadt. The com-

mander-in-chief, Admiral Nepenin, easily realized that the revolutionaries were going to have the upper hand of the old government. In order to preserve his fleet for the struggle against Germany, he decided to take the initiative of transferring it to the allegiance of the new revolutionary government and he was backed in his purpose by the council of flag officers and captains. A message was wired to Petrograd containing the recognition by the Baltic fleet of the provisional government that had been formed by the Duma. For several days after this no disorder occurred, except for a few comparatively insignificant breaches of discipline, and the keen interest displayed by the men for what was going on in Petrograd. It seemed reasonable to hope that the revolution in Helsingfors would take a peaceful course and would not be sullied with bloodshed. The facts, however, proved quite different. It must be remembered that from the start a rivalry arose between the Petrograd soviet of workmen's delegates and the provisional government, which manifested itself best of all in the soviet's tendency to assure their control over the Petrograd garrison. This rivalry found an echo in Helsingfors.

The officers were not fully aware of what was going on in Petrograd. They had a vague idea that all the revolutionaries and all those who had identified themselves with the revolution were united into one common front. Of the divergence between the socialists, whose stronghold was the Petrograd soviet, and the provisional government, who represented the liberal parties of the Duma, they had no suspicion.

Meanwhile, since the outbreak of the revolution, the old social revolutionary associations on board the ships of the Helsingfors squadron were beginning to awake from their torpor and had started an active propaganda among the crews, displaying the greatest energy on the battleships *Emperor Paul I* and *Andrey Pervozvanny* and *Slava*. The members of these fighting associations, bred as they were on the idea that the officers of the navy were the most trustworthy bulwark of black reaction, could not understand Nepenin's motives in recognizing the revolutionary government and did not believe in his sincerity. They suspected that this recognition was only a tactical move to gain time and prepare a counter-revolution. The behavior of Nepenin, whom they knew to be a man of strong will, sharp and stern, was a

puzzle to them. These active revolutionaries had always imagined that in case of a revolution, the navy could be gained only by putting down the armed resistance of the officers who had been always loyal to the old government, and many of whom had sacrificed their lives in suppressing mutinies. The peaceful accession of the officers, with the commander-in-chief at their head, to the cause of revolution was incredible and incomprehensible. As most of these revolutionaries were semi-educated men with strong voluntary impulses but without any broad intellectual outlook they had not been able to note the change which came over the officers in connection with the Rasputin affair, with the speeches of even conservative members of the Duma against the government, and with the general state of Russian public opinion in the beginning of 1917. They thought the officers were the same staunch supporters of autocracy as they had been in pre-war times, and expected to meet with their traditional resistance.

Now that the revolution had taken place so peacefully in Helsingfors, the fighting associations found themselves without an enemy to fight. The mine had been prepared for explosion but there was nothing to explode—the enemy had dismantled their own walls. But the destructive tendency of the fighting associations was so powerful that, as the central soviet of Petrograd made no attempt of explaining to the local bodies that they had no more work to do—the inertia of revolution had its way. The signal was given and the blood of numerous victims was shed.

It is certain that German agents who carried on relations with the Russian revolutionary parties (I am affirming this, not of the principal leaders, but of the secondary local agents) did what they could to prevent the peaceful transmission of power to the new government. They sowed mistrust of the officers among the seamen, playing on feelings originating in causes of the second category, i. e., in the shortcomings of the Russian naval organization that were resented by the seamen.

The first outburst took place on the battleship *Andrey Pervozvanny*. The signalman of the watch made an attempt to light a red light on the fore mast as a signal for the men to rise against the officers, but was shot dead by the officer of the watch, Lieutenant Bubnov. This led to an armed encounter between

the officers and the crew of the battleship in the course of which were killed Rear Admiral Nebolsin, Lieutenant Bubnov and several others. The mutiny immediately spread to the ships stationed in the neighborhood, and on the *Emperor Paul I* several officers were also killed. On the battleships of the first brigade (four dreadnoughts) there was no bloodshed, the crews only demanded of the officers the surrender of their arms. Admiral Bakhirev ordered the officers to deposit their revolvers in his cabin, but refused to hand them over to the crew.

A group of men from the *Andrey Pervozvanny* and the *Paul I* went on board the torpedo boats which were stationed in the port and killed several officers of the torpedo division while the crews of the torpedo-boats assisted passively at the massacre.

But on the brigade of new oil-burning torpedo boats (of the *Novik* class) the crews opposed the rebels and refused to deliver their officers, among whom was the commanding officer, torpedo division, Rear Admiral Kedrov.

The commander-in-chief, Admiral Nepenin, had his flag on the unarmed yacht *Krechet* whose crew remained calm and were only afraid of the mutinied battleships opening fire on the defenceless flagship. Nepenin wired to the provisional government reporting the turn events were taking in his fleet and candidly avowing that he considered them as fatal to the fighting efficiency of the fleet. This message became known to the seamen and was used by the leaders of the revolutionary associations as a material for their agitation against the admiral. By this time a soviet of seamen's, soldiers' and workmen's delegates had sprung up in Helsingfors, and Ensign Garfield, a member, as I have said, of the Bolshevik party, was beginning to play a leading part in it. A mob of seamen, mostly from the *Andrey Pervozvanny* and the *Paul I* crossed the ice to where the *Krechet* was stationed and their armed delegates, coming on board, announced to Nepenin that by the will of the revolutionary navy he was under arrest.

On their way from the flagship to the city the seamen informed the admiral that he was sentenced to death and that the sentence would be carried out immediately. Nepenin remained perfectly calm, took out his cigarette case, lit a cigarette, and gave himself the order to fire. Such was the end of the admiral who was the first of naval commanders to recognize the revolutionary govern-

ment. He was put to death by an irresponsible secret association of terrorists and no party ever had the courage to assume the responsibility for this senseless murder. The fate of Nepenin was similar to that of the d' Albert de Rion, senior naval officer at Toulon in 1789. The national assembly made, on that occasion, the following statement: "Acknowledging as justifiable the motives that guided M. d' Albert de Rion and the other officers of the navy, as well as those that guided the members of the municipality and the national guards who took part in this affair, the national assembly declares that there is no ground to blame anyone." (*Moniteur*, January 1st, 1790.) The national assembly, however, showed more energy than did the provisional government who did not even have the courage to order an official investigation of the Helsingfors events, sanctioning thus the right of seamen to massacre their officers whenever they thought fit.

In several cases the murders were accompanied with tortures and mockery, as, for example, Lieutenant Lange had his fingers cut off. The bodies of the murdered officers were brought to the dispensary of one of the hospitals, but even there they were not left in peace by their torturers. The bodies were propped up along the walls in the pose of saluting, and Admiral Nepenin in the middle of the room with a cigarette thrust in between his teeth, "The commander-in-chief and his staff," the murderers explained to the other men.

Like in Kronstadt the Helsingfors massacres were carried out according to a list previously drawn up. Several officers who were on the list escaped their fate by happening to be on shore and the murderers' not being able to find them. Admiral Kedrov was preserved from Nepenin's fate by mere chance, owing to the fact that he had been summoned to Petrograd by the provisional government who had appointed him under-secretary to Guchkov, the war and naval minister.

Horrible scenes were witnessed in the dispensary—where the widows of the massacred officers were rudely and cynically mocked at by the murderers.

It is important to retain that the massacres were carried out by a very small group of seamen for the most part from the *Andrey Pervozvanny* and the *Paul I.* The majority of seamen were only passive spectators and sometimes even opposed the

murderers (e.g., the crews of the oil-burning torpedo boats and of the first brigade of battleships). There were several cases of young seamen going mad after witnessing the horrors of this St. Bartholomew's night.

Nepenin was replaced in the command of the Baltic fleet by Vice-Admiral Maximov, a man of unlimited ambition but with no strong sense of honor, and not very intelligent. He was elected by the seamen and confirmed by the provisional government. With the appointment of this "Red" Admiral, as he was called by the too-officious Petrograd press, began a period of agony for the Russian navy in the Baltic.

We have enumerated the causes that led to these massacres; we will now try to investigate their relative importance in the tragic events of Kronstadt and Helsingfors.

As to the causes of the first two categories they were materially the same in Kronstadt and Helsingfors, as in Reval and in the Gulf of Riga (where the battleship *Tsesarevich* belonging to the same brigade as the *Andrey Pervozvanny* and the *Paul I* was passing the winter). In the Black Sea things were even somewhat more complicated, as Vice-Admiral Kolchak and the officers who came with him (headed by Captain M. Smirnov) had begun in 1916 to introduce the order which existed in the Baltic fleet and the revolution found the Black Sea fleet in a period of transition. Nevertheless, in Reval and in the Gulf of Riga the critical period passed comparatively calmly; there were no cases of naval officers murdered, though several army officers were killed by the soldiers in regiments stationed near Reval. In the Black Sea the transmission of power to the new government was not only peaceful, but was accompanied by the formal expression of complete confidence in their officers on the part of the men. Collisions between the officers and the men began here much later and chiefly under the influence of strangers—propagandists arriving from Kronstadt and Helsingfors. This confrontation of facts proves that the conditions of naval life at Russia were not in themselves sufficient to bring about the massacres which took place in March, 1917.

Consequently, though we do not deny that the shortcomings of discipline and organization existent in the Russian navy had their

part in breeding those unfavorable relations between the officers and the men, and thus preparing favorable conditions for revolutionary propaganda, we must recognize that this propaganda, and, to a certain degree, the agents of the German intelligence service, must be held responsible for the blood of so many of the best Russian sailors, shed in Kronstadt and Helsingfors. In Kronstadt, where the influence of the Bolshevik party was from the very beginning predominant, the events were so consequent that hardly any doubt is possible, especially if we remember the methods later adopted by that party, viz., the extraordinary commission for combating counter-revolution, speculation and sabotage, better known by the name of *Chrezvychayka* or *Cheka*. The Bolsheviks drew up a list in which they included all the more energetic and active officers whom they believed incapable of compromise and methodically destroyed them, profiting by the favorable moment. Every mob is cruel, but a revolutionary mob, which is not yet sure of its ultimate triumph, is doubly so. It was not very difficult for the Bolsheviks to direct these bloodthirsty instincts in the direction they wanted. The seamen of Kronstadt did for them the work which in later days was done by the *Cheka*—they decapitated the *intelligentsia* and the bourgeoisie by destroying all their more noble and staunch elements.

The conditions in Helsingfors were different. The revolution had already attained its first objective—the recognition of the provisional government—without the aid of the seamen, by the decision of Admiral Nepenin and the council of flag officers and captains. But the revolutionary fighting associations who had lost the moment for effective action desired to expend their reserves of energy on the head of the "Turk at the Fair" and this part fell to the officers. On the other hand the German general staff was dissatisfied by the peaceful course of events in the strongest squadron of the Baltic. The combined action of these two agents brought about the mutiny of two battleships while the rest remained passive spectators. It is characteristic that the time when on three or four battleships of the second brigade the officers were being massacred, on the fourth (the *Tsesarevich*) stationed in the Gulf of Riga and isolated from external influences, the crisis passed more or less peacefully, in spite of the fact that there relations between officers and men had always been

rather bad. The same may be said of the torpedo division. On the coal-burning torpedo boats stationed at Reval the critical days passed without any disagreeable incident and complete order was preserved, while the fifth flotilla stationed at Helsingfors was completely disorganized by the murder of most of the commanding officers and the senior officers.

The Black Sea fleet which in 1905 had been the scene of bloody outbreaks traversed the critical period quite peacefully, owing to the fact that it was isolated from the influence of revolutionary propaganda from Petrogad, as well as from the activity of German agents. All this has brought us to the conclusion that causes of the first two categories played a comparatively unimportant part in the genesis of the massacres of March, 1917, in the Baltic fleet, and that causes of the third category were the most weighty. The officers of the Baltic fleet were not the victims of a long-suppressed wrath of the seamen oppressed and offended in their human dignity, but the objects of the terrorist activity of secret organizations who regarded them as dangerous to the revolution.

Turning to the historical parallels we see that in the great revolution the officers of the French navy suffered almost exclusively from the persecution of political extremists to whom they were members of the hated aristocracy. Grimoir, Kersaint, and d'Estaing perished, not by the hand of mutinous seamen, but under the knife of the guillotine.

The mutinies of crews of the British navy in the last years of the eighteenth century present a different picture. We may find here, it is true, some traces of political propaganda—the United Irishmen and other Irish revolutionary groups on the one hand, the agents of the French government on the other, took an active part in these mutinies. But their true causes lay in conditions which we have discussed under the first two headings. The mutiny of the crew of the *Hermione* which led to the death of all her officers, including quite young midshipmen, had no political basis. The cruelty of Captain Piggott and the imperfection of British naval organization in the pre-Jervis period incited the seamen to mutiny. The petitions drawn up by the seamen's delegates at Spithead and on board H. M. S. *Sandwich* in Nore clearly show that exceedingly hard material conditions and oppression were the only causes of the seamen's unrest. We hear,

it is true, of the sloop *Shark's* going over to the enemy, but on such a small vessel the presence of a few revolutionary Irishmen or of several educated men press-ganged under the *ad captandum vulgus* act might have been decisive.

Thus we see that the seamen's mutinies which accompanied the revolution in Petrograd occupy an intermediate place between what happened in the French navy under the revolution and the mutinies of the British seamen. In France naval discipline was destroyed exclusively by external political influences, whereas in England the mutinies were the outcome of impossible conditions of service.

To conclude, the author cannot refrain from mentioning a characteristic incident which took place on board the torpedo boat he was commanding, nearly simultaneously with the Helsingfors massacres.

When Nepenin's telegram announcing that he had gone over to the Duma was received in Reval, the division commander assembled all the commanding officers of the torpedo division to discuss the situation. It was decided to follow the example of the commander-in-chief and to announce this decision to the crews. On returning on board his boat the author ordered a parade on the quarter deck. After briefly relating what had happened in Petrograd the author announced the decision of Admiral Nepenin and the council of senior officers. As the speech was received with reserve and the men expressed neither joy nor regret at what had happened, he addressed the men nearest him and asked them what they thought of the revolution. He was much astonished by their answer, "The same as you, your honor." And this was going on only a few dozen miles away and only twenty-four hours before the mutiny of the *Andrey Pervozvanny* and when blood had already flowed at Kronstadt.

The explanation is that at Reval the seamen were left to themselves. They were beyond influence of revolutionary organizations, nor were the German agents so active as in Finland, where they had made themselves a cozy nest.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SOME MUTUAL RELATIONS OF GUNNERY AND TACTICS

By Captain Ralph Earle, U. S. Navy

"Damn the torpedoes," said Farragut, "Four bells, Captain Drayton, go ahead! Jouett, full speed!"—Mobile Bay, 5 August, 1864.

"Keep nearer to the enemy."—Beatty at Dogger Bank, 24 January, 1915.

The world war witnessed the development of new types of sea warfare such as the tactics of destroyers against submarines, of submarines against other submarines, as well as the beginnings of those to be employed by aircraft against both submarines and surface vessels, those utilizing smoke screens, noxious gases, seaplane carriers and torpedo planes. The newness of many of these weapons was such as to preclude their possibilities being given a real test and there have resulted many claims as to the potential power of each new weapon, some of which are conceded generally to be reasonable while others are conceded extravagant. Be that as it may, naval warfare is an extremely complicated profession and the old sailor's worries were few when compared with those of the modern seaman. The latter's greatest reliance must still be placed upon his own prompt offensive against each new instrument of destruction. Every offensive weapon produced is soon matched, if not actually excelled, by the defense adopted against it.

The extensive use of mines and depth charges against vessels operating both on and beneath water formed perhaps one of the most important types of warfare developed during the war. The recent experimental use of the aircraft bomb against old vessels has indicated that it too is most efficient when used as a depth charge.

Gunnery broadens its scope to meet the new conditions and must provide the means to defeat the attack of air forces, deadly gases, and whatever else the future may bring. The motive of the tactics that such gunnery most efficiently can utilize is well expressed in the words of the two great seamen quoted at the head of this article. The submarine was downed by the newly developed gunnery and tactics of the destroyer, and a similar fate is the portion of the forces of the air and of those using gases.

A few of the relations of gunnery and tactics will be touched upon with the hope that any means not now existent to defeat the new weapons may be studied and brought to perfection. To accomplish the great results desired the peace-time navy suffers from the lack of a proper allowance of personnel in its bureaus at the shore stations. The number of officers so assigned is generally only sufficient to carry on the routine of administration, none are available to intensively study and digest the mass of information acquired in war, while such is yet fresh in their minds. Any slowness of new developments in the navy is due principally to this insufficiency of officer personnel in the bureaus, the only places where the information is accessible. To reason out the lessons of the war, to develop the new devices indicated, while at the same time perfecting the old stand-bys is a task that requires the undivided attention of experienced professional men.

Naval gunnery is the art and science of firing guns, torpedoes, bombs, and other weapons in the best manner to effect the greatest possible damage to the target. Tactics similarly is the art of maneuvering a battle fleet before and during action against any enemy in the manner best adapted to ensure success; and it, therefore, requires superiority over the enemy in any or all of several factors; such as numbers, types, guns, speed, protection, use of radio and aircraft skill, experience, morale and doctrine. Tactical maneuvers include all that proximity to the enemy dictates as being the proper disposition of fleet or vessels to meet the conditions of the battle then imminent.

Beyond a doubt the relation of tactics to gunnery is so close that in order to obtain the desired final result—i.e., decisive victory in battle—instead of being dependent one upon the other, they merge and unite to form the one essential attribute that must

be possessed by the victor at sea to a greater degree than is the case with his opponent.

Skill in both tactics and gunnery must be developed to the highest degree attainable, and a deficiency in either cannot be allowed to hamper the free use of the other in battle. Our naval commanders must be free to maneuver at any time secure in the fact that thereby they are not lessening the effectiveness of their gunfire. If this be not now the case a direction for study is surely indicated.

The tactical portion of gunnery is the method employed by the various war craft in getting the maximum destructive effect out of guns, torpedoes, bombs, depth charges, and other naval weapons.

Some maneuvers that affect gunnery are those that place the fleet or ship in an advantageous position as regards to sun—better spoken of as the light gauge—wind, rain, and the methods employed when in gun or torpedo range to get the maximum destructive results of the gun and torpedo. At the same time fleet or ships must maneuver to decrease their liability to injury from the fire of the enemy.

Instruments for keeping the range of the target must be of such a character as to make the problem of hitting so simple that battle gunnery will be similar to that of a stationary vessel firing at a stationary target.

In order to derive the greatest effect from the armament, those tactics must be employed that will place the ship in the most advantageous position with regard to the enemy and take full advantage of all tactical considerations and compel him to expose the largest target while depriving him of the use of a portion of his battery. In order to succeed vessels must utilize their speed to compel the enemy to maneuver disadvantageously, to meet his maneuvers, and to make the range such that any advantages one possesses, armor, protection, or gun power may be utilized to the utmost.

The gunnery experience of the battle of Jutland indicated that a very searching inquiry into the methods of shooting might result in much betterment. In order to avoid torpedoes, of which seamen rightly stand in awe, both sides maneuvered constantly and no fire control then existing was able to make gunnery as

good as if no maneuvering had been necessary. Can any fire control be devised to accomplish this?

If gunnery is of a grade such that it compels a steady course to be steered, then a ship will be compelled to fight on a course parallel to or converging upon the enemy, a condition only possible providing that the enemy is similarly handicapped. Notwithstanding the difficulties of keeping the range it is evident that maneuvering must be frequent in battle, and to win the decision our sights that direct the fire must be kept set constantly to the range and deflection necessary to ensure hitting the target, though both these factors may be changing continually. In other words, a commander-in-chief engaging an enemy must be able to use his ships at any speed from their highest to lowest with a completely free choice of courses, such choice being uninfluenced by any fear that the efficiency of his armament will be affected more by one maneuver than by another. Torpedoes, mines, aircraft bombs and submarine forces can be avoided in a large measure by maneuvering while still using the heavy guns.

Thus a survey of the subject confirms the fact that gunnery and tactics are so intimately related that they evidently must work in harmony, and give all an ideal to be striven for in the necessity of so providing means of control that the use of either is absolutely unrestricted by the other; and, upon investigation, it will be found that, if, by the application of modern science, such may be now the fact, nevertheless they have hampered each other in the past. Gunnery has always suffered when it has been found necessary to maneuver. This condition must be eradicated if we are to be truly efficient.

Tactics of the sailing ship and the auxiliary steamer were closely allied and, from the Texel, in 1665, when column of battle was first formed, through the Nelsonian era when close action was still the rule—although the long column had given way to several columns directed at logical points in the enemy's lines—down to the use of the ram which appeared at the same period as armor, they consisted in short-range fighting and followed the conventional principles. The ram as a weapon had its one great day at the battle of Lissa, July 20, 1866, being soon eliminated by the introduction of high-powered guns, long-range torpedoes, and the submarine.

The object of tactics, however, is still the same as when propounded by its first real master, Nelson, namely: that the only purpose of the battle is to secure a complete victory, and that only the offensive will accomplish this objective. Togo was a modern exponent of Nelson tactics which caution boldness as he, under gunfire, maneuvered so as to employ all his force while preventing the enemy from doing so, even though his own fire was reduced thereby for the time being. The studied tactics of Nelson, however, were not required by Admiral Togo as the superior force of the Japanese used without fear made the defeat of the weaker Russian certain beyond any doubt.

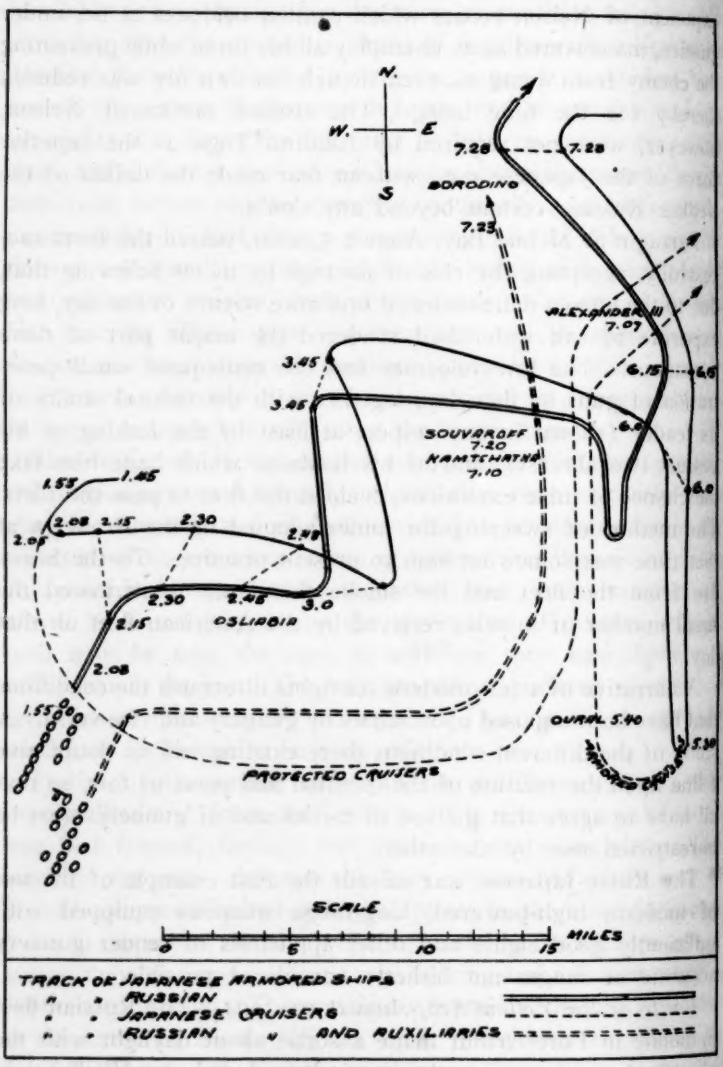
Farragut at Mobile Bay, August 5, 1864, passed the forts successfully, accepting the risk of damage by mines believing that, due to the known deficiencies of ordnance science of the day, long exposure to salt water had rendered the major part of them innocuous. The low velocities and the consequent small penetration of guns of that day, together with the tactical ability of its leader (shown in one respect at least by the lashing of his vessels two abreast), and of his boldness which bade him take the chance of mine explosions, enabled the fleet to pass the forts. The method of sweeping for mines adopted by the *Brooklyn* at that time was somewhat akin to present practice. To the heavy fire from the fleet and the smoke therefrom is attributed the small number of injuries received by the American fleet on that day.

A narrative of a few modern sea fights illustrates the conditions that have been imposed upon tactics by gunnery and vice versa. A study of the different conditions there existing will no doubt give a line upon the solution of the question and point us fair, so that all have to agree that the use of tactics and of gunnery must be unrestricted one by the other.

The Russo-Japanese war affords the first example of the use of modern, high-powered, long-range weapons equipped with sufficiently good sights and other appliances to render gunnery accurate at ranges not hitherto considered possible.

Battle of the Yellow Sea, August 10, 1904.—The Russian fleet immobile in Port Arthur made a sortie about daylight with the object of uniting with their squadron based on Vladivostok. This movement resulted in two distinct contacts with the Japanese

fleet. A southerly breeze was blowing with a mist hanging over the sea. At 12:30 P. M. the engagement opened, the fire becoming general at 1:13 P.M. The Russians withdrew, some returning to Port Arthur, others to neutral ports. The Japanese maneu-



"TSUSHIMA"
MAY 27-1905

vered in squadrons with the Russians in single line. The Russians ought to have been sunk instead of being dispersed. At dark the Russians were surrounded by the torpedo fleet and repeated attacks were made against them, many torpedoes being fired. The cautious tactics of the Japanese prevented a decisive end to the action.

Tsushima, May 27, 1905.—The Japanese fleet maneuvered in squadrons and by superior speed kept the Russian fleet, then in a long flung unwieldy column, under superior gunfire. The weather was too rough for destroyers. These vessels made their attack upon scattered units of the enemy at night when the sea moderated. Scouting had indicated to the Japanese the formation and course of the enemy; radio signalling, then in its infancy, making the imparting of such information possible. The Japanese concentrated on van and rear, maneuvered by squadrons and kept the action at long range by utilizing superior speed and gun power.

At the commencement of the world war, August 4, 1914, the British navy began that continuous patrol of the North Sea, scouting close in to the German coast, which resulted in many contacts of the hostile forces with several casualties in both single and squadron engagement; the first being the sinking by a mine of the British light cruiser *Amphion* in the afternoon, August 5, 1914, immediately following her successful attempt to destroy the German mine layer *Königin Luise* at some sixty miles off the Suffolk coast. The British destroyers and the *Amphion*, after a long chase of over thirty miles, accomplished this by their accurate gunfire, which tore away the *Luise's* bridge, damaged her bow, and smashed the propeller.

The largest guns used in this action were the four-inch, and reports indicate that the gunnery was excellent; all conditions favoring it, the range altering but little during the chase and making, in the smooth water with no demoralizing return shots, good marksmanship as simple as a target practice maneuver.

On August 10, 1914. in the North Sea, a British light cruiser squadron engaged several German submarines, the presence of the latter being indicated solely by their periscopes, which left their usual tell-tale wake. By the British, speed and changes of course were utilized to confuse the Germans, and then some bril-

liant gunnery by the *Birmingham* shattered the periscope of the *U-15*. Blinded, the latter dove under water and her consorts made off. Eventually she came to the surface only to receive a shot from the *Birmingham* which struck the base of the conning tower, ripping the whole structure clean out of the submarine, which sank like a stone.

The British, by utilizing high speed and frequent changes of course, together with accurate gunnery, developed at the very outset of the war proper tactics for fighting the undersea craft, for even under date of March, 1917, it was noted in authoritative dispatches from abroad that direct gunfire from the decks of men-of-war and auxiliary vessels had proven a most effective method employed in the destruction of submarines.

Thus it is seen that, but a few days after the war was on, the British navy discovered that good gunnery still proved to be a most efficient and practicable way to destroy submarines. The effectiveness of the depth charges dropped overboard, although at random, was soon improved by supplying new types of guns suited for such a special purpose and using gunnery in their employment. Tactics in these combats dictates speed and changes of course to avoid the attack and the use of good gunnery to destroy the attacker. This method is of course not sufficiently spectacular to attract popular comment for it lacks the means of stirring imaginative persons into inventing peculiar bombs, nets, guns and freak torpedoes. Nevertheless the real enemy of the submarine is good gunnery combined with tactics, the use of which soon destroys its power of damaging its prey.

Bight of Helgoland, August 28, 1914.—A British reconnaisance in force of the waters adjacent to Helgoland, begun late on the night of August 26, 1914, resulted in an engagement of considerable importance that lasted throughout the day of the twenty-eighth. A great number of gun duels took place between light cruisers and destroyers of British and Germans. The British generally possessed six-inch guns opposing them to four-inch guns of Germans. Ranges were between 4,000 and 3,000 yards. The British *Arethusa,* outnumbered, was severely damaged by gunfire. One German sumbarine is known to have been destroyed by gunfire. The German *Mainz* after but twenty minutes of action was disabled and on fire, being sunk soon after. The British

battle-cruisers came in at the proper time to rescue the *Arethusa*, then being chased by the *Koln*, and in turn chased the Germans.

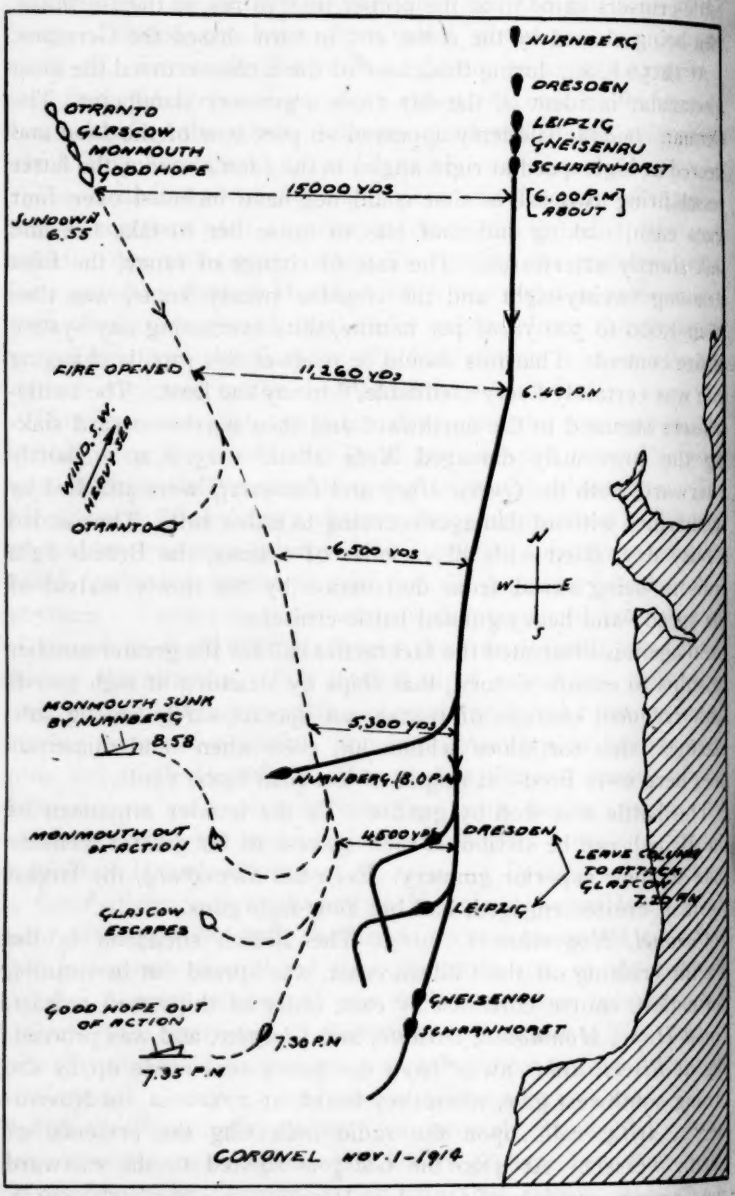
At 12:56 P. M., during this chase of the *Koln*, occurred the most spectacular incident of the day from a gunnery standpoint. The German *Ariadne* suddenly appeared on port bow of the *Lion* and steered at high speed at right angles to the *Lion's* course, the latter vessel firing two salvos that could not have included over four shots each, making sufficient hits to cause her to take fire and sink shortly afterwards. The rate of change of range, the *Lion* steaming twenty-eight and the *Ariadne* twenty knots, was thus from 1,000 to 500 yards per minute, thus overtaxing any system of fire control. That hits should be made at this rapidly changing rate was certainly "very creditable,"[1] to say the least. The battle-cruisers steamed to the northward and then northwestward sinking the previously damaged *Koln* about 1:25 P. M. Shortly afterward, both the *Queen Mary* and *Lowestoff* were attacked by submarines without damages accruing to either side. Thus ended a busy day, filled with all varieties of actions, the British light cruisers being saved from destruction by the timely arrival of the speedy and heavy-gunned battle-cruisers.

So again is illustrated the fact tactics call for the greater number of ships to ensure victory; that ships by steaming at high speeds with frequent changes of course can operate safely among submarines; that torpedoes seldom hit, even when—and numerous ones here were fired—at ranges of less than 6,000 yards.

The battle was won by gunfire. To the heavier armament of the British can be attributed their success in far greater measure than to their superior gunnery. Even the *Strassburg*, the largest German cruiser engaged, had but four-inch guns.

Coronel, November 1, 1914.—The British squadron in the Pacific cruising off the Chilean coast, was spread out in scouting formation, course northeast by east, order of ships west to east, *Good Hope*, *Monmouth*, *Otranto*, and *Glasgow*, and was proceeding at fifteen knots away from the heavy seas made up by the strong southwest gale, when they heard, at 2:00 P. M. on November 1, 1914, calls upon the radio indicating the presence of enemy vessels. At 4:20 the *Glasgow* sighted to the eastward the German squadron of four ships steaming on a southerly course,

[1] Beatty.


NURNBERG
DRESDEN
LEIPZIG
GNEISENAU
SCHARNHORST
OTRANTO
GLASGOW
MONMOUTH
GOOD HOPE
15000 YDS
[6.00 P.M ABOUT]
SUNDOWN 6.55
FIRE OPENED
11,260 YDS
6.40 P.M
WIND S.W. HEAVY SEA
OTRANTO
6,500 YDS
N
W
E
S
MONMOUTH SUNK BY NURNBERG
8.58
5,300 YDS
NURNBERG 8.0 P.M
MONMOUTH OUT OF ACTION
4500 YDS
DRESDEN
LEAVE COLUMN TO ATTACK GLASGOW 7.20 P.M
GLASGOW ESCAPES
LEIPZIG
GNEISENAU
GOOD HOPE OUT OF ACTION
7.30 P.M
SCHARNHORST
7.35 P.M
CORONEL NOV. 1-1914

and the British vessels then closed in on the *Good Hope* steaming northwesterly courses. Upon the completion of this evolution at 5:30, they headed around in columns on the southerly course with the Germans seven miles distant to the east steaming south, the ships of both squadrons pitching into the seas and taking water over forward. The overcast sky, lightening towards sunset, silhouetted to the Germans the forms of the British ships to the westward.

German column order was *Scharnhorst,* the gold medal gunnery ship of that navy, *Gneisnau, Leipzig* in column at 400 yards, the *Dresden* one mile astern, with the *Nurnberg* much farther to the rear.

The failing light made the Germans a difficult target. At 7:03 P. M. fire was opened at range of 12,000 yards, the first shots coming from the Germans. The squadrons now were steaming to the southward into the sea on slightly converging courses, the vessels firing at their opposites. The growing darkness and heavy spray thrown up by the seas made handling guns and accurate firing very difficult, the British main deck guns which comprised the major part of their armament constantly being flooded by the seas. The spotting was seriously handicapped, due to the seas that swept the bridges and decks. The small cruisers made very heavy weather.

The third salvo from the Germans caused fires to break out forward on both the *Good Hope* and *Monmouth.* This certainly was getting the range quickly despite the rough weather. As soon as the Germans observed hits they changed course to parallel the British. The *Otranto* here left the British column and steamed away to the southwest. Range became about 6,500 yards and the Germans bore off a point, but the British changed their course and reduced range to 5,300, possibly with the idea of firing torpedoes. The moon now rising made the German vessels better targets for the British and so the former bore away slightly in order to change and increase the range. Darkness had come on, the range-finders on the German vessels used the fires on the *Monmouth* for awhile, but range-finding, spotting and pointing soon became impossible with the result that firing was stopped at 8:06. During the battle it is claimed that the *Scharnhorst* was hit but twice and the *Gneisnau* only four times. About 7:50

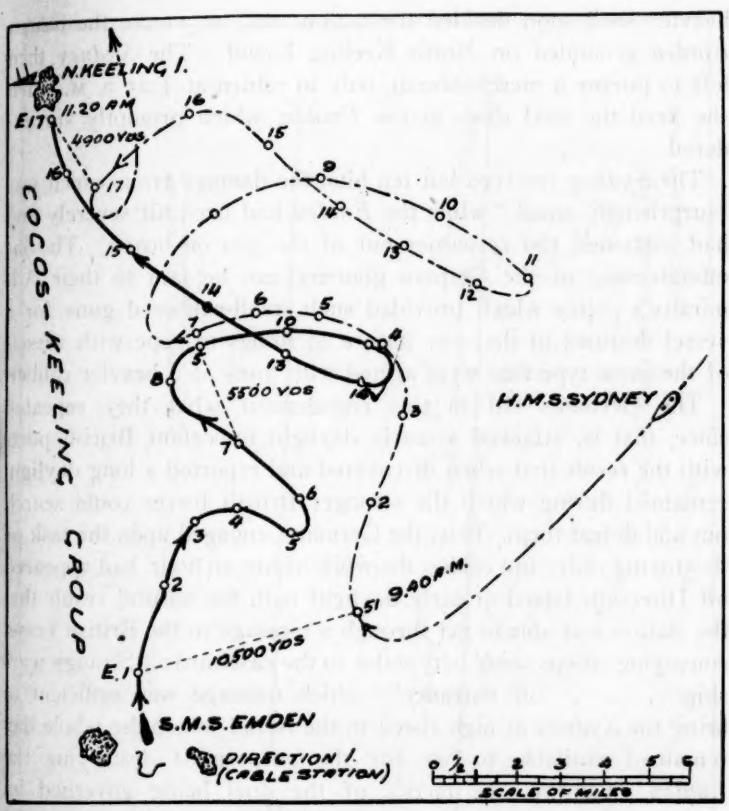
a column of fire from an explosion shot up between the stacks of the *Good Hope*. Total destruction must have ensued. About 8:00 P. M. a very heavy rain squall occurred. The *Monmouth*, down by the bow, turned away to get stern to sea. The German light cruisers were directed at 8:00 P. M. to follow and attack British with torpedoes.

About 9:26 the *Monmouth* was encountered and sunk by gunfire at closest range by the *Nurnberg*. The flashes of this late night action were observed on the *Glasgow* standing away to the southwest straddled by splashes from the shots of the pursuing *Leipzig* and *Dresden*. The heavy sea prevented any work of rescue on the part of the Germans.

The Germans had sixteen major-caliber guns to the British[2] two, although, as the former could not use all on the same broadside, the figure should really be quoted as twelve. The British had thirty-two six-inch against the German twelve. However, the Germans are reported to have had an excellent director firing system in this action, and this very probably accounts for their superior gunnery.

The "Sydney" and "Emden," November 9, 1914.—The German cruiser *Emden* about daylight landed a party on Direction Island with instructions to destroy the radio and cables. While this party, under the command of the executive officer, comprising forty-nine out of the *Emden's* crew of 361, was absent, the Australian cruiser *Sydney* was sighted at 9:20 steaming in towards the island, whereupon the *Emden* promptly steamed out for battle. At 9:40 the *Emden* opened fire, the *Sydney* promptly replying, sheering out so that the range could be kept great, an advantage she desired because of her heavier guns and one which she could maintain because of her greater speed; as one of her officers wrote, "We had the speed on the *Emden* and fought as suited ourselves." The *Emden's* fire was rapid and accurate at first but as the *Sydney* began to hit the gunnery of the *Emden* grew less and less efficient. A lucky shot at the very beginning carried

[2] "The fate which befell Sir Christopher Cradock was due to the inferiority of the ships under his command. He might have declined battle. To an officer of his chivalrous and daring nature that alternative was impossible. Not long ago, as a veteran, he rode second in the Grand Military at Sandown, and only lost by a neck. If he had been in command of a gunboat he would have fought."—Earl Brassey.



SYDNEY VS. EMDEN NOV. 9-1914

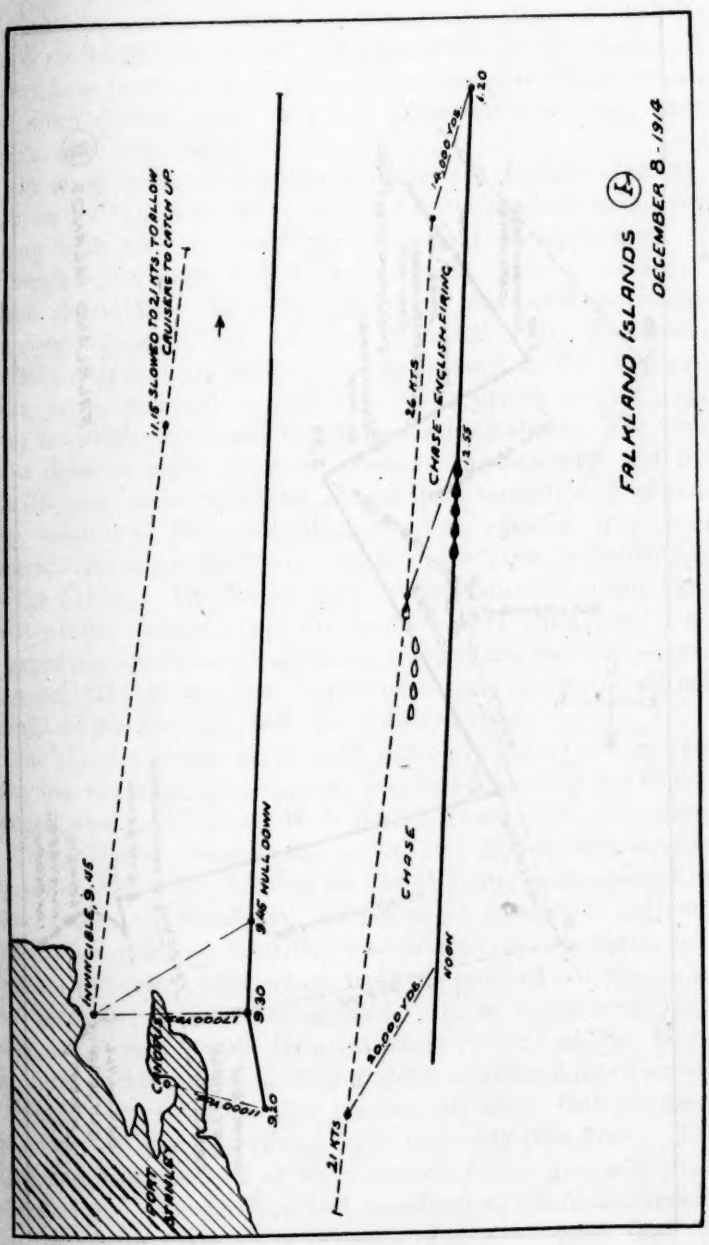
away all voice pipes of the *Emden* and in consequence centralized control of fire was thereafter not feasible. The *Emden's* smokestacks were shot away one by one so that her speed was further reduced. The opening range was 10,500 yards, a very long flight for the four-inch shell of the *Emden* and a range that gave a great advantage to the six-inch guns of the *Sydney*. The *Emden* made every endeavor to close the range (note the course at position 7 of chart) in order to overcome the odds of small guns and also to make a torpedo hit, her movements being rendered difficult because of damage to steering gear. The *Emden's* ammunition supply also gave out before the end of the battle. The

heavier shell soon decided the action, and, at 11:20, the beaten *Emden* grounded on North Keeling Island. The *Sydney* then left to pursue a merchantman, only to return at 4:25 P. M. when she fired the final shots at the *Emden*, which promptly surrendered.

The *Sydney* received but ten hits, the damage from which was "surprisingly small," while the *Emden* had been hit severely and had sustained 129 casualties out of the 320 on board. The ineffectiveness of the German gunnery can be laid to their Admiralty's policy which provided such small-calibered guns for a vessel destined in the very nature of things to cope with vessels of the same type that were armed with guns of a heavier caliber.

The Germans did in this engagement what they repeated since, that is, attacked at early daylight important British ports with the result that when discovered and reported a long daylight remained during which the stronger British forces could search out and defeat them. Thus the Germans, engaged upon the task of destroying radio and cables, the work of but an hour, had appeared off Direction Island at early daylight with the natural result that the station was able to get through a message to the British vessel convoying troops some fifty miles to the eastward: "Strange warship . . . off entrance"—which message was sufficient to bring the *Sydney* at high speed to the island where the whole day remained available to her for the purpose of destroying the *Emden*. Gunfire, the tactics of the duel being governed by superiority of these weapons, accomplished this without material loss, as at no time was it necessary to close in order to hasten the end desired.

Falkland Islands, December 8, 1914.—This is one of the most interesting battles of the war from a plain gunnery standpoint. The British here used long-range firing, maintaining the range as they wished because of superior speed. Heavier guns and greater speeds were advantages that could not be offset; and, to make the odds worse, Von Spee had approached to attack at early morning. If he had waited till evening or, when seeing that he was outmatched, had turned sharply to southward and westward—either of these acts sufficient—more of his squadron would have escaped. And yet even when he saw it was too late to escape by flight, Von Spee had a "Cradock choice" but did not take it.


FALKLAND ISLANDS
DECEMBER 8 - 1914
INVINCIBLE, 9.45
11.15 SLOWED TO 21 KTS. TO ALLOW CRUISERS TO CATCH UP.
9.45 HULL DOWN
9.30
9.10
PORT STANLEY
CHASE
CHASE - ENGLISH FIRING
24 KTS
21 KTS
20000 YDS.
14000 YDS.
1.20
13.55
NOON

FALKLAND ISLANDS (II)
INVINCIBLE
INFLEXIBLE
CARNARVON
CORNWALL
GLASGOW
KENT
LEIPZIG
NURNBERG
DRESDEN
GNEISENAU
1.25
SCHARNHORST
GNEISENAU
2.10
2.10
2.45
OPENED FIRE
CHASE
2.53
SCHARNHORST
ON FIRE
GNEISENAU HORES
LAST HIT
SCHARNHORST
SINKS
4.04
3.30
SCHARNHORST
LOST FUNNEL
3.30
ARTILLERY DUEL
ARTILLERY DUEL
14000 YDS
13500 YDS
12450 YDS
25 KTS
24 KTS
N
S
E
W

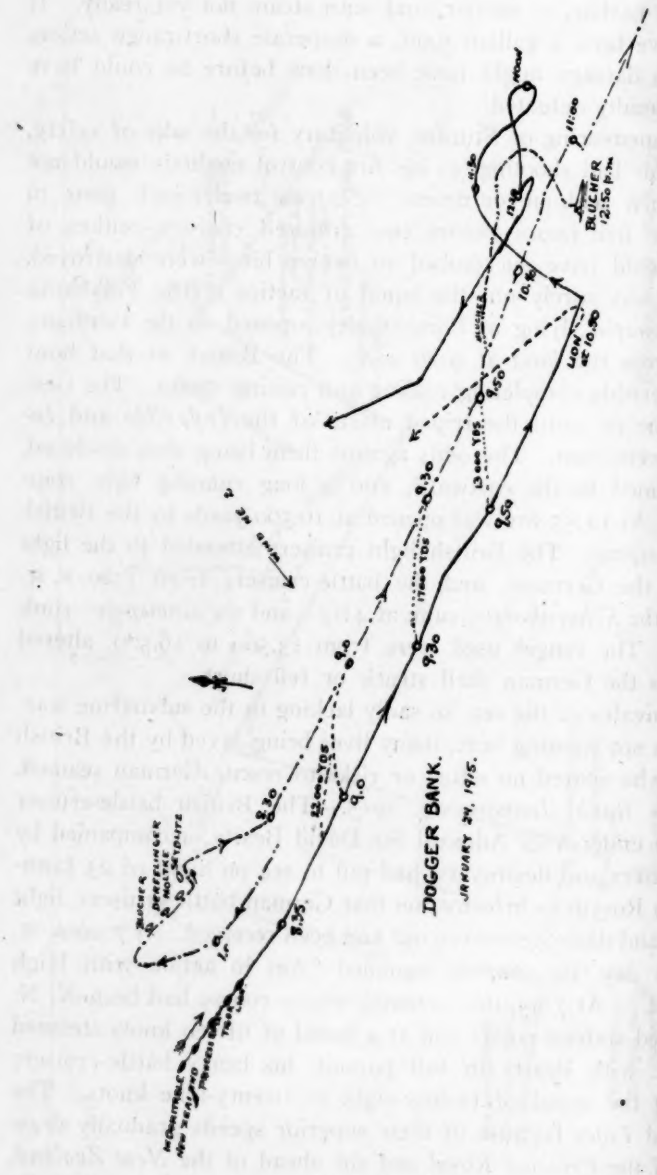
He could have steamed into Port Stanley and attacked the British in the harbor, at anchor, and with steam not yet ready. It would have been a gallant fight, a desperate short-range action, and much damage might have been done before he could have been eventually defeated.

The maneuvering of Sturdee, voluntary for the sake of safety, explains his bad shooting, as his fire control methods would not permit such without detriment. Sixteen twelve-inch guns in action for five hours before two armored cruisers—either of which should have succumbed to twelve hits—were destroyed. Gunnery was surely not the equal of tactics at the Falklands.

The *Canopus*, lying in Port Stanley, opened on the Germans, firing across the land at 9:20 A. M. The British at that hour were feverishly completing coaling and raising steam. The Germans came on until the tripod masts of the *Inflexible* and *Invincible* were seen. The odds against them being thus disclosed, they steamed to the eastward, and a long running fight commenced. At 12:55 fire was opened at 16,500 yards by the British on the *Leipzig*. The British light cruisers attended to the light craft of the Germans, and the battle-cruisers from 1:20 P. M. engaged the *Scharnhorst*—sunk at 4:17—and the *Gneisnau*—sunk at 6:00. The ranges used were from 13,500 to 16,500, altered at will as the German shell struck or fell short.

The chivalry of the sea, so sadly lacking in the submarine warfare, was not wanting here, many lives being saved by the British seamen who spared no effort or risks to rescue German seamen.

Dogger Bank, January 24, 1915.—The British battle-cruiser squadron under Vice Admiral Sir David Beatty, accompanied by light cruisers and destroyers, had put to sea on night of 23 January from Rosyth as information that German battle-cruisers, light cruisers and destroyers were out had been received. At 7:20 A. M. the next day, the *Aurora* signalled "Am in action with High Seas fleet." At 7:45, the Germans whose course had been N. N. W. turned sixteen points and at a speed of fifteen knots steamed E. S. E. with Beatty in full pursuit, his heavy battle-cruisers attaining the speed of twenty-eight to twenty-nine knots. The *Lion* and *Tiger* because of their superior speeds gradually drew ahead of the *Princess Royal* and she ahead of the *New Zealand*, and the *Indomitable*. The first sighting shots were fired by


DOGGER BANK.
JANUARY 24, 1915.
BLUCHER
12:50 P.M.
LION
at 10.30
11:00
10.30
9.50
9.30
9.0
8.30
8.35
13000 YDS
11000 YDS
12000 YDS

Lion at 22,000 yards, falling short, and firing commenced after the first straddle was made at 9:05 A. M. From 7:25 to 9:30 A. M. the British had closed the range from 28,000 yards to 17,000 yards, or at that rate of about 4,800 yards per hour.

At 9:30 range was 17,000, and at 9:50 had decreased to 13,000, the closest of the action. It was at 9:35 that signal was made on the British flagship to "engage corresponding ship in line." The *Tiger* did not get this order so that the *Moltke* was left undisturbed by shells to get in her fire on the *Lion*. To open the range the Germans changed course sharply to north under cover of a destroyer feint and smoke screen. At about 10:00 A. M. and for a short time thereafter, both sides did very ineffective gunnery. A destroyer attack at 12,000 yards received effective fire from *Lion* and *Tiger*, the attack being quickly abandoned. In a running fight such as this the Germans zigzagged to reduce effect of British fire as well as to keep their guns in action. The British adopted lines of bearing, and as guns became blanked in firing, changed together one point to port at least twice in order to keep the maximum number of guns firing.

The German battle-cruisers *Seydlitz*, *Moltke*, *Derfflinger*, and *Blucher*, maintained their E. S. E.'ly course at top speed as a squadron until towards 10:30 A. M. when the *Blucher*, hit heavily, was left behind to her fate. This vessel had been dropping astern gradually, and, at 10:48, she hauled out to port, steering north being on fire and having a heavy list, where she sank at 12:05 P. M. The *Lion* was hit frequently and, at 10:52 A. M., to avoid submarines, British changed eight points to port and quickly thereafter to N. E. in order to close the range. As the *Lion* drew out of battle at 11:07 A. M., Beatty hoisted signal, "Keep nearer to the enemy." Unfortunately the action instead was broken off, and the chance of annihilating Germany's battle-cruisers gone. When Beatty managed to transfer his flag to the *Princess Royal* via the destroyer *Attack*, it was impossible to again enter action as the Germans had escaped in the distance and the opportunity had gone.

The first ranging shots in this action were fired at 22,000 yards, hits began at 18,000, the range decreasing rapidly, but the change of range and its rate of change were very gradual and fairly constant, while the size of the target was at a maximum, the whole

length of the ships being presented. Ideal conditions, those were for good gunnery, and while fewer hits than expected were made much progress towards greater accuracy has been made since. To lessen the damage accruing by skilful fire control, changes of course, together with destroyer attacks and smoke screens were used. The gun alone decided the tactics in this battle between these lightly armored and speedy ships. The heavier guns belonging to the British and the range being great, the bigger volume of fire and the close action, the importance of which was considered by the German navy to be greater than larger-calibered guns, did not help their battle-cruisers, which abandoned one, the pioneer of its type, to certain destruction and fled. The lesson evidently is that in actions between similar vessels the ones that have the heavier guns will possess the control of the blue water. As the power of the gun, and consequently the effective range of modern battles, increases, so does the realization that control of gunfire must increase in skill become more evident.

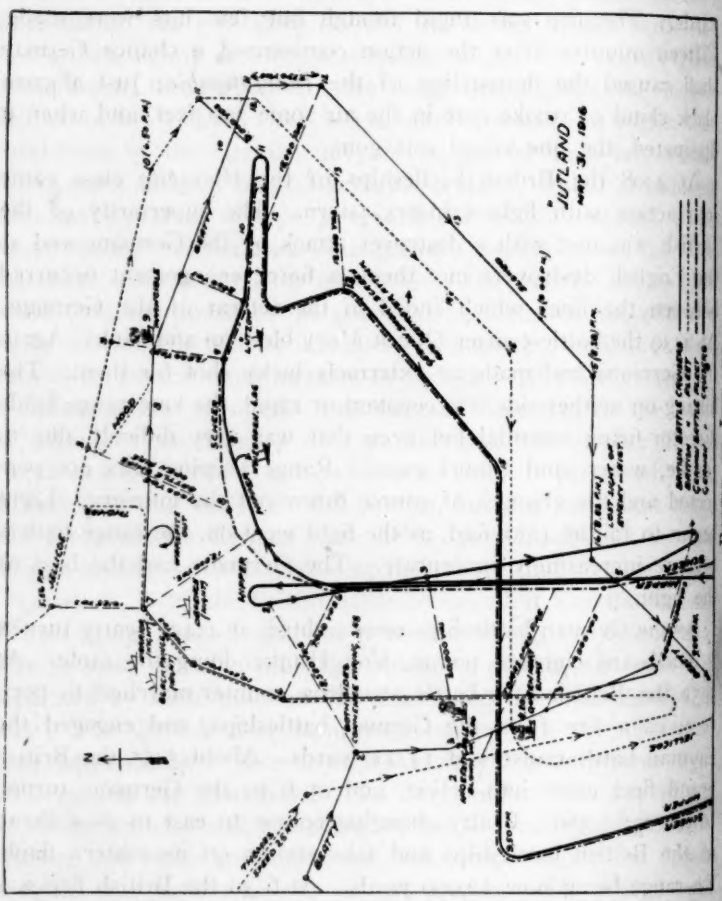
Jutland, May 31, 1916.—The German fleet was in the habit of making from time to time various two-day cruises in the North Sea as an entire unit in order to train its personnel. The British fleet was desirous of a contact, but due to distant bases and the extensive German mine fields found it difficult to time its movements, so as to arrive at the proper time to give battle. On May 31, 1916, the British battle-cruisers left Rosythe and the British grand fleet, Scapa, for a rendezvous in the North Sea. Due to some miscalculation the two parts of the fleet were still separated by some miles at the time when they had desired to join. The British fleet comprised twenty-nine dreadnoughts, nine battle-cruisers, nine armored cruisers, twenty-three light cruisers, and 147 destroyers. The German fleet was out on one of its exercise cruises, steaming in battle formation with light cruisers and battle-cruisers ahead, and comprised sixteen dreadnoughts, five battle-cruisers, six pre-dreadnoughts, fifteen light cruisers and about 123 destroyers. The force engaged in the action that commenced at 3:48 P. M. thus consisted of the largest number of vessels in a sea fight in modern times. This battle of the Jutland, or Skaggerack, is one in which ships and fleets maneuvered freely, changed courses by ships to avoid torpedoes frequently, and zigzagged in order to derange gunfire. When the

latter was too heavy, destroyers made smoke screens and attacked with torpedoes.

The weather was clear, wind light and variable, the visibility varying from 21,000 to 10,000 yards. The action between the six British battle-cruisers and the five German opened at 16,000 yards. The fire was rapid though but few hits were made. Fifteen minutes after the action commenced a chance German shell caused the destruction of the *Indefatigable;* just a great black cloud of smoke rose in the air some 300 feet, and when it dissipated, the fine vessel was gone.

At 4:08 the British battleships of the *Warspite* class came into action with light cruisers astern. The superiority of the British was met with a destroyer attack by the Germans and as the English destroyers met them, a fierce engagement occurred between the lines which ended in the retreat of the Germans. At 4:30 the battle-cruiser *Queen Mary* blew up and sank. Again the Germans had made an extremely lucky shot for them. The hitting on neither side was constant or rapid, the long range made director-firing essential but even that was very difficult, due to smoke, water, and funnel gases. Range keeping was not perfected and the changes of course threw out the gunnery. Light began to fail at 4:30, and, as the fight went on, the range finders became increasingly inaccurate. The Germans had the best of the light.

As the German battleships were sighted, at 4:42, Beatty turned to starboard eighteen points, Von Hipper doing the same. At 5:52 the British fifth battle squadron counter-marched to port, received a fire from the German battleships, and engaged the German battle-cruisers at 14,000 yards. About 5:55 the British grand fleet came into action, and at 6:10 the Germans turned to the right 360°, Beatty changing course to east to pass ahead of the British battleships and take station on its eastern flank, the range being now 12,000 yards. At 6:30 the British fire was effective on the German line. At 6:35 Rear Admiral Hood was lost by the sinking of the *Invincible*. The German *Lutzow* left the line at the same time. Visibility grew worse rapidly, the enemy turning southward under fire at but 8,000 yards. Destroyer attacks and smoke screens aided the Germans in their turn southwest. The battle continued intermittently from 6:17


JUTLAND
MAY 31 - 1916
BATTLE OF JUTLAND

to 8:20 P. M., at ranges from 9,000 to 12,000 yards. The Germans kept on towards the west, the *Weisbaden* having sunk at 7:00 A. M. The *Warrior* was severely damaged and lost the next day. The fleets[3] lost contact during the night and made port next day.

The Germans apparently concentrated their fire, as battle-cruisers next in line to the ones sunk were hit but seldom. With enemy zigzagging, shells striking and detonating, water[4] deluging decks, destroyer attacks, torpedoes, smoke screens and funnel smoke, the conditions of target firing were certainly absent and one can believe that the personnel would be at not much over fifty per cent efficiency. The gun pointers could see practically nothing. The accurate shooting of target practice was wanting and rate of hitting could not have been over one hit per gun per two hours.

At long ranges, such as these, gun pointers could seldom see the target and hence the director method of aiming had to be used. Gun fire was the main factor in this, as in other battles, an enormous number of rounds being fired. The damage done by the Germans, armed as they were with lighter guns must have

[3] Comments on Jutland. On several occasions on 31 May, vessels reappeared from the mist, and fire had to be immediately re-opened before a single rangefinder reading had been obtained. These conditions will always be experienced frequently and so they cannot be considered other than usual, and provision must be made accordingly. The necessity for instant means of enabling the captain to put the control officer, director pointer, spotter, guns and rangefinder on to the target selected was demonstrated many times during this battle.

The general impression was that, at first, fire was very rapid and accurate for range, but frequently bad in deflection; the spread was, as a rule, small. It is interesting to note, however, that no ship which survived the action appears to have been hit by a complete salvo; on several occasions ships were undoubtedly hit by two shells in one salvo, but generally speaking only by one. Instantaneous salvos and some form of very rapid ripple were in use.

After starting quickly, and establishing hitting in a very short time, the German fire fell off gradually. Whether this was due to the fact of their ships being hit, causing a lack of accuracy in the use of their fire control system, or whether it was due to zigzagging to avoid being hit, or whether due to visibility conditions is not known. There is no doubt that after 6:30 P. M., their firing was indifferent, but the light conditions were then entirely reversed and this may be sufficient to account for it.

The efficiency with which the Germans concentrated a rapid fire from more than two ships on a particular ship or on a turning point of the British column, was very creditable.

[4] The water from the splash of a 12-inch shot weighs about 1,600 tons, it being 120 to 130 feet in height.

been due to the fact that they maintained a great rapidity and volume together with a greater accuracy of fire.

Tactics of the fleet in sea battles initiated by DeRuyter and perfected by Nelson have been shown to the world in different phases, by Farragut, Sampson, Togo, Jellicoe, and Beatty. All these felt the restrictions of movement enforced by the limitations of modern gunnery, which ought no longer to exist. The adoption of real fire control and thus real gunnery should enable battle tactics to be developed without the irksome necessity of considering what will happen to the accuracy of the fire when unexpected changes of course or speed are made.

The fleet of Rear Admiral Sampson at Santiago, July 3, 1898, obtained but a percentage of 3.3 hits[5] with the mean range only of 1,800 yards, when excluding the *Oregon's* few shots at the *Colon* fired at her extreme gun range of about 11,000 yards. During the battle there was practically no maneuvering and nothing else to interfere with accurate gun fire. The personnel was surely equal to that of the present day, the poor results being due in the main to slow loading arrangements, poor sights, low velocity guns, and so on. In other words, matériel was then far behind the personnel. The telescope sight was there, but not sufficiently rugged to stand the shocks of gunfire, it being still crude, though much improved upon the first. The result of the battle was such that Santiago did not emphasize the lack of good control in the gunnery line sufficiently to arouse the navies of the world to its needs.

Even at Tsushima in 1905 the gunnery range had increased to but 9,000 yards, this latter increase being permitted by the gunnery improvements made in the interim. Such gunnery improvements are responsible for the changes in tactics and the disposition and caliber of main battery guns.

The real awakening and start of progress came along in the years 1901 to 1903, when matters in the gunnery line began to hum. Sir Percy Scott gave the gunnery of the English fleet a jolt on the China Station that was transmitted by Admiral W. S. Sims to the American fleet. Gunnery became a fetish, and

[5] Of course, as the enemy obtained a far lesser percentage of hits, this lack of efficiency in shooting was not very important or serious to our fleet.

in 1903 the late Professor P. R. Alger published his remarkable essay on gunnery which stirred our own navy to further efforts.

The range of 300 yards in Nelson's day produced slow ships and close action, while many calibers of guns were included in the batteries of vessels. In 1848, our ordnance had only just commenced to evolute into present-day types; and it is an interesting fact that in said year there devolved upon Commander J. A. Dahlgren, U. S. Navy, the task of equipping all our navy cannon with sights! The firing ranges were still inside of 2,000 yards, the pivot gun shooting a projectile of sixty-eight pounds being the main reliance in ships' armament; and again, in 1856, Dahlgren enunciated as a leading principle of ordnance that "the main element of ordnance power is represented by one caliber." Attempts had been made to follow that principle from time to time, but it was not really accepted and adopted by the world until Naval Constructor R. R. M. Robinson reproduced the idea practically in the *South Carolina*, and later in the *Delaware* type.

The telescope sight of Rear Admiral Fiske, improved by Commander Mustin, rapidly pushed possible ranges to the extreme limits of visibility. Gunnery then soon had to seek for better means of laying guns and controlling their fire.[6]

The first real attempt at long-range firing was made possible by the modern director systems of fire introduced in the British navy by Captain Percy Scott, R. N., in 1911, on the *Neptune*. Long ranges thus became no obstacle, as the pointer at the directorscope installed higher than the guns, could fire as soon as the

[6] In gunnery, as well as in other sciences, progress goes in a circle, one that constantly increases in size as its limiting factors are rendered less restrictive by improvement in mechanical arts. So now we see navies again using the system of gun pointing and firing known as director firing, a type that was first introduced into the gunnery art by Captain Richard Kempenfelt—lost on the H. M. S. *Royal George*, 1782—in the days when ranges were exceedingly short.

This circle of gunnery was completed with the re-introduction of the Kempenfeldt system in the director firing methods of Captain Scott, R. N. Such a "fire director," mounted in the foretop, was fitted to the *Thunderer;* and, in September, 1912, two crack gunnery ships of the British navy held competition trials off Bantry Bay. The *Orion*, not equipped with a fire director, in smooth weather did as well as the *Thunderer*, the errors under such a condition being those due to the inherent dispersion of guns, towards the reducing of which the best efforts of both ordnance and gunnery officers are still being directed. In rough weather, however, rolling five degrees and over, the *Thunderer* shot five times as well as did the *Orion*.

masts of the target appeared above the horizon. In fact it is recognized that in the battle of Jutland the enemy target ships were much of the time invisible to the pointers because of the interference of the splashes, the powder and the funnel smoke quite as much as because of the low visibility conditions; and, without the directorscope, accurate firing would have been impossible.

After this start in the present gunnery—which insured sea fights at long ranges, the next steps were taken with the view of keeping the range after it had been once obtained. Methods in vogue up to and including the battle of Jutland did not succeed in accomplishing this, but improvements in the methods and the instruments for range-keeping have worked wonders, until it is confidently believed that battle fleets of the world have a fire control system that will keep the target straddled by salvos, be the changes of speed and courses by both firing ship and target what they may.

The ranges at which modern sea fighting take place are variously estimated by our highest authorities, many claiming that not over 12,000 yards will be the determining range. Our target practices cause us to believe differently and to concur with the commander of the British fleet at Jutland, Admiral Jellicoe, who stated in March, 1916, that "ships of today open fire at 22,000 yards range and gunfire begins to be very effective at 18,000 yards"; and we believe that a 30,000-yard range is now not improbable.

Long-range target practices began to be held in our fleet, these being at ranges at first of but 4,000 yards and at stationary targets. But as ranges increased, so did the matérial improvement; it had to. The officers demanded the best and all gunnery started upwards.

Many able officers devoted their brains and their energies to the development of fire control, both organization and matériel. The principles involved were recognized and instruments to effect the desired results were gradually produced. Ammunition handling, rugged and immobile sights with better graduations, range finders, clocks, and projectors, all came in for much attention.

The Russo-Japanese war had showed quite clearly to all navies that long ranges were to rule in modern sea battles, and that the

fleet having the best sights, gunnery, and fire control instruments, and organization was bound to win.

So by 1911 it was not unusual to obtain thirty per cent of hits at 11,000 yards under open sea conditions with our pre-dreadnoughts. It is axiomatic that to hit successfully at long range one must obtain correct ranges, apply the sight bar correction for atmosphere and temperature conditions, reduce dispersion to its minimum, spot the salvos on, and then keep the range after once it is found; a problem intricate in a high degree as the rate of change of range must be kept even though it is varying constantly due to one's own and one's target changes of both course and speed. The errors of rangefinders were reduced gradually to twenty-five yards in 6,000 yards by the training of their operators, and by improvements in the instruments both in size and ruggedness. Not only must any successful fire control system accomplish the foregoing but it must also enable the firing ship after once on a target to shift that target at any time without suffering a loss of accuracy.

Greater and greater ranges came within the possibility of ships as the power of guns increased, and as the necessity for keeping away from the long range torpedoes became apparent. Visibility then soon began to be a limiting factor in gunnery and hence the tops became the logical places from which to direct the fire.

The directorscope mounted aloft became a fixture in all navies, and, as a result, ranges at target practice of over 20,000 yards, with higher percentage of hits than at Santiago, are now common; while in the future ranges of 30,000 to 35,000 may be expected, visibility being the only limiting factor. In battles during the world war, an extreme of 18,000 yards has been noted, but such an extreme range was not maintained, the ranges closing to 14,000 yards and less before decisive damage was inflicted.

Even with long ranges, modern battles indicate that the best shooting ships at target practices can be expected to give the best accounts of themselves in battle, as witness the record of the *Scharnhorst*.

Mechanical methods for gunnery control are decidedly necessary in battle. One knows, if the slightest unexpected incident occurs in target practice, how the poise and skill of gun personnel are upset and with what fatal results to the score. How

much greater will this be in battle[7] is easily comprehended. The usual estimate is that the mentality of a gun's crew is reduced in the strain of battle to fifty per cent of the normal. Such conditions, together with the noise and shock, naturally reduce normal mentality in a marked degree. Our mechanisms, not only for loading but for accurate shooting, must be made then so as to depend more and more upon the mentality of a few, that is they must be aided by the best mechanical and electrical appliances possible.

To insure good gunnery the best means that can be developed are adopted to insure correct sight bar range or elevation of the guns, errors in which magnify the errors in increasing proportion as the range increases. Other varying quantities to contend with are the constantly changing speeds and courses of your own ship and those of the target enemy, the atmospheric conditions, the obscuring of enemy by low visibility, by shell splashes, by other vessels or by smoke screens of destroyers or vessels themselves. Due to these conditions the rapidity of heavy gunfire with modern turret guns handled safely is not much over two per minute although loading times are short enough to permit many more rounds to be fired.

In the simplest conditions of gunnery we find that a stationary ship is able to hit a stationary target at a very satisfactory rate; but that as conditions change this is decreased greatly, as at target practice, and still further in actual battle and therefore gunnery should aim at providing means for reproducing the stationary conditions no matter what courses and speeds are used by both firing ship and enemy. To do this is no easy problem indeed, but modern science applied to fire control has made great strides towards its solution. Into this question comes also the fact that a target is likely to be invisible practically as much of the time as it is to be visible, due to smoke of guns, to the funnel smoke of the firing ships or of the next one ahead, or to smoke screens of the enemy, to splashes produced by short shots, or to enemy ships afire, all of which require that the

[7] Whenever shells struck near the ships, great columns of water were thrown up which thundered upon and flooded the decks. Clouds of flying splinters fell upon the decks or whistled through the rigging. Great brands hurled by the bursting shells hissed and blazed on all sides, melting and charring everything they touched.—(Schriebe, *Battle of Jutland.*)

method adopted for keeping the range must allow for these conditions. The courses and speeds must be altered at will without detriment to one's gunfire if torpedoes, mines and submarines are to be avoided. To hit with a torpedo also demands a great accuracy in fire control appliances and in trained skill in operators, as the course and speed of the enemy are vital to success here.

Shore fortifications, because of the accuracy of their gunfire insured by their immobility and accurate range-finding methods, are practically immune from serious bombardments by vessels. The odds in favor of the fort, however, are somewhat reduced by modern fire control methods. Vessels now can or should be able to bombard effectively by indirect gunfire, changing course and speed at will, and even do so at night when the flashes of their guns will be the only target for the fort. Thus serious damage to morale, personnel, and matériel of shore positions must be expected when attacked by a fleet. Flashless powder, developed by the navy in 1918, by not disclosing the firing vessels by the bright customary flash, practically prohibits a fort's returning the fire of a night bombardment while flares or illuminating projectiles disclose it to the attacking vessels.

To bombard, if not underway on changing and various courses and speeds, insures the range of the vessel being picked up by the fort, even though smoke screens should hide her, for in this case her position can be located by sound ranging, aircraft spotting and gun smoke. After the range of the vessel has been picked up by the forts, and salvos are landed about her, discretion will indicate to her the wisdom of withdrawing at once. If, in order to approximate the stationary conditions, the vessel moves slowly, it will be the more easily attacked by submarines. Speed and ever-changing courses must be maintained by the vessel. Gunnery, for long years after the modern high-power guns came into use, did not permit such movements without its effectiveness being absolutely nullified thereby. Now, however, fire control should be perfected to a degree that the commander afloat can feel no such handicap. Once he obtains the range he will keep it; and when, as in the case of a fort, his target is immobile, he can never lose it no matter how fast or how changeably he may steam, all smoke screens notwithstanding. His immunity to torpedoes is greater because of his movements, and also to

mines because of modern methods of ship protection. Fire control has here made marked advances, and who can say with assurance that a bombardment may never be undertaken by a fleet, or by single vessels, underway.

Bombardments unless followed by strong land attacks do not give the measure of success that would warrant the risk of the operations. The modern examples of fort bombardments are the various attacks in the Dardanelles, the heaviest ones being those on March 1st, 18th and 25th, 1915. While the forts were seemingly silenced the enemy claimed that they were not seriously damaged and it is noted that they always resumed fire on the next attacks. A bombarding fleet must sweep for mines, must be prepared against submarine attacks, and must maneuver in order to make accurate return fire difficult. Without freedom of movement, casualties to ships are very heavy, and, unless the forts can be occupied, bombardments are without a gain commensurate with the loss. On March 19, 1915, for example, while engaging the forts at the Dardanelles Straits from 10:45 A. M. to 6:05 P. M. the battleships *Bouvet, Irresistible,* and *Ocean* were all sunk by mines, notwithstanding that sweeping for mines had been conducted carefully and systematically, while the *Inflexible,* because of the loss of her fire control stations, was put out of action. These bombardments did establish the power of the fleet to dominate fortresses by superiority of fire. All this is futile unless the fortresses are occupied by troops, for the damage done by the fleet is seldom real or lasting, the success is only momentary and spectacular, as forts can repair their damages and regain their former power far more quickly than battleships can be built.

The *Königsberg* was destroyed in the Rufigi river on July 11, 1914, by the monitors *Mersey* and *Severn,* the fire being governed by seaplanes. Salvos were fired slowly, about two every three minutes, and, after once spotted on, the hitting was of such an amount that in thirty minutes no fire was returned by the German vessel.

This action at the Rufigi River showed that after the range was once obtained, in this case after but eight minutes, a rate of hitting of one per gun per two minutes was obtained with a six-inch gun at about 10,000 yards, a rather long range for that

gun. Yet, on a previous occasion, the rate of hitting was about one hit per gun in four hours. This only shows what an extreme difference can exist between results given by a right method of fire control as compared with a wrong method, a ratio of 1,200. The tactics employed were correct but the use of gunnery on the first day was not efficient. The Jutland battle gave a rate of hitting of about one per gun per three hours at ranges never over 14,000 and for sometime from 12,000 to 8,000 yards.

Gunnery, of course, cannot insure hitting a target that constantly changes course, because to accomplish this it must possess the acomplishments actually possessed only by true prophecy. Nevertheless, the fleet in bombarding a fort does have this unknown factor eliminated and can derange the fort's fire by its own great mobility of such character that it in no wise will affect its own. Fire control in all navies does provide instruments designed so that changes of courses on the part of the enemy are quickly discerned and notice given to the fire control party.

In modern fleet actions all the conditions that existed at the Jutland, but intensified and added to, must be expected. Danger to all vessels existed in the air, on and under the water. Destroyers harassed the main fleets by their incessant activity with smoke screens and torpedoes, the water being literally alive with the latter. Torpedoes, with their long and even increasing ranges, fired promiscuously are a danger far worse than either the anchored mines or the floating mines drifting on the surface of the water. To defend oneself against the two latter paravanes and bow wave are generally sufficient, while to cope with the former speed with sharp and unpredicted changes both of speed and course are necessary.

For years admirals have been hampered by the fact that to even zigzag in an orderly manner would hopelessly derange modern gunfire, although it is a proceeding vital to success whether operating offensively or defensively. Whether or not such is the case now depends altogether upon the appliances fitted for fire control and the ability of the personnel operating them.

A fleet that constantly zigzags in battle and can yet keep hitting the enemy has an enormous advantage over one that cannot.

To change the range by unexpectedly altering courses and speed is the most efficient means of reducing the effect of an enemy's fire; but such is not possible unless your own gunnery is of the caliber that is able to keep the range of the enemy without harm to its own effectiveness.

Torpedoes, mines, and bombs, whether from surface, undersea or aircraft notwithstanding, it is still the gun that decides the issue of all sea battles, and passively or actively it gives the naval power that commands the sea. The gun is the dominant factor, and tactics must use maneuvers and utilize speed so that the maximum gun power may be brought to bear on the enemy through guns well placed for maximum effect. To maintain the gun at its best for the longest time, a ship, by frequent changes of course and speed, must maneuver so as to vary the range of the enemy and thus lessen the accuracy of his fire by complicating his fire and control and, in order to avoid his torpedoes, zigzagging under fire is certainly necessary, and provision must be made so that the accuracy of your own fire is not harmed thereby. Freedom to change course and speed being then the requirements of modern tactics, gunnery must meet them, and so it does in an ever-increasing degree.

Scientific methods of range keeping and director firing in gunnery combined with seamanship of the old school remodeled to suit conditions, now have combined to such a degree that the commander of a vessel ought to feel free to change at any time speed, course, range, or target without losing any advantage or decreasing his offensive or defensive power. The mutual relations of tactics and gunnery thus have produced means whereby both may be used *ad libitum* without one thereby lessening the effect of the other. Both must excel and neither should hamper the other.

Gunnery then in the passing years has steadily progressed and may be said to be keeping pace with tactics, allowing the admiral free and untrammeled use of all its advantages. Such, we have seen, was not always the case, the increase in gun power being more rapid than the devising of exact methods to control it under all conditions at sea. However, fire control cannot do the impossible, and even if it is as perfect as practicable, the errors in the trajectories of guns at the ever-increasing ranges still make

high percentages of hits problematical. Gunnery is also devoting much attention to correcting variations in flight of shell at long ranges striving to overcome the unknown factors that are ever present in the problem.

New ways of using torpedoes, depth charges, aircraft bombs and other deadly weapons are constantly being devised. But gunnery soon meets each new weapon. No one doubts but that a sufficient amount of explosive placed at the right spot will sink or destroy any vessel whether in the air, on the surface of the sea, or under the sea. The difficulty is to place it there. All big ships were doomed when the torpedo was invented, and yet again when the destroyer came into being, yet again when the submarine was produced, and now great faith is placed in the powers of aircraft, both torpedo plane and bombers. Even several torpedo hits are not fatal. The *Marlborough* at Jutland fired seventeen salvos after being torpedoed several times, eluded a submarine attack, and after the battle steamed to her base at twenty knots. A greater number of vessels were destroyed by heavy gunfire than by torpedoes. The *Warspite* hit by only two high explosive shells was in a much worse plight than the *Marlborough* with her torpedo hits. Also the damage ensuing from the hits of heavy bombs dropped by aircraft upon old capital ships proved of far less extent than had been expected. The target presented by a torpedo plane's ninety-seven-foot spread is enormous, as is likewise that of the big bombing planes.

The use of suitable tactics of ships in battle line will reduce their chances of being struck by bombs from aircraft with even greater ease than now is the case in avoiding torpedoes. To one who has watched an attack by bombing planes how evident is the point they must reach to drop a bomb upon a moving surface vessel. How simple it is for the anti-aircraft battery of that vessel to make it impossible for the aircraft to reach the point necessary. Many new methods of locating and hitting attacking aircraft are practicable. The method now used by the duck hunter in aiming his shotgun may be adapted to directing the fire of the big guns acting against aircraft. The numerous machine guns, semi-automatic guns of larger caliber, and the easily manipulated anti-aircraft guns of larger than four-inch with their perfectly functioning fuses make the lot of an attack-

ing air-man anything but a happy one. To judge from experiences in the world war air pilots cared not to go over even the crudely directed batteries at Dunkirk and elsewhere. They will hardly dare to encounter modern anti-aircraft guns controlled with the efficient systems which are or will be devised to hit them both by day and by night.

The use of gas had added terribly to the dangers of modern war. There is an answer to that in like manner to which torpedoes, guns, and bombs have been countered. The bringing of gas in quantity to the scene of a naval battle involves problems in the solution of which not a real start has yet been made. If not invisible when spread, ships by tactical handling will avoid their neighborhood, the sea will soon dehydrolyze and render them innocuous. Then again, should an invisible lethal gas cloud pervade a ship, new masks not alone on individuals but on all intakes for air will counteract their deadly action, not to mention their real and most powerful offensive, or defensive if you prefer, antagonist; the cylinders of gas ready to release that immediately decompose the lethal gases made by man into the harmless ones which human beings are meant to breathe. Again the ventilating system of a vessel may be so constructed as to drive out noxious gases in a very short space of time. This is essential for even when the gas ejectors fitted to turret guns fail the turret's crew are greatly inconvenienced. While the best method of dealing with a gas attack is not yet in sight, it is certain that troops, cities or ships are not tamely going to submit to being gassed, as the advocates of gas warfare generally appear to think. There's another side to this gas question that does not appear often in print and that's the efficacy of the defensive methods developed to render its attacks innocuous.

Gas and the supergun of sixty-five or seventy miles in range may be used to drive a fleet out from under shore fortifications and compel it to seek the decision on the high seas. Gunnery will control the uses of both gas and supergun in such operations. The attacks upon fleets at sea by forces of air and gas are essentially difficult of execution. The airplane carrier is not yet developed successfully and when constructed along proposed lines will be a prey to the battle-cruisers of a nation provided with such vessels but will be a menace to a navy without huge battle-

cruisers with their thirty-two knots of speed in all weathers and 48,000-yard gun range.

Some class proper tactics as superior to any armor protection—*vide* "Speed is armor," Lord Fisher—such protection being at best but partial and vulnerable, and it being nullified by proper gunnery of the enemy, and its lack being compensated for by fearless tactics.

The gunnery officers, whom the crew and sometimes their messmates regard as crazy enthusiasts, imbued with the mad desire to reach one goal—a higher percentage of hits and greater rapidity of fire than before—have made modern gunnery what it is now, and are daily improving methods, while the effort of ordnance to make the matériel more perfect than the personnel never slackens, and as one by one its defects are brought to light, they are studied in the hope of overcoming them.

Be the instruments no matter what, without enthusiasm, training, and ability in personnel, an accurate and rapid fire cannot be maintained at long ranges.

> . . . as long as man is human, we shall have to count on men,
> Though machines be ne'er so perfect, there may come a day perhaps,
> When you find out just how helpless is a heap of metal scraps.
>
> —HOPWOOD.

So the navy puts full reliance in its gunnery officers, and they so work as to push the gunnery of the fleet to the highest pinnacles. Unhampered by the fear that inaccurate shooting will result because of free maneuvering, the commanders afloat now place their vessels where and when they wish in the endeavor to get the tactical advantages necessary for maximum gunfire effect.

The conclusion, therefore, should be that modern gunnery, the fire control being in skilled hands, at the present date can offer no handicap whatever to an absolutely free use of naval tactics in battle; and further, it has so advanced that, properly utilized, a ship even may venture once again, as in the days of our grand admiral Farragut to bombard shore fortifications, and do it with the chances of success in its favor. Gunnery now does not hamper tactics, and therefore, as is usual in the see-saw of progress, the battle tactics of the fleet units must develop and provide surprises and Nelsonian means to inflict an overwhelming defeat upon an enemy.

In the preceding pages mention has been made of a few of the many problems in both gunnery and tactics that await solution at the hands of ordnance and gunnery experts during the years of peace. History tells us that we now can expect at least thirty-one years of freedom from war. During this period we must keep advancing in the profession of warfare on the sea, bearing in mind, when discouraged at the little attention that will be accorded the navy by our countrymen, what would now be the state of the Anglo-Saxon world had the British seamen given up their intensive preparations and researches during the one hundred years of peace vouchsafed their navy just prior to the world war.

All things in gunnery are possible to him who sincerely tries, and skilful use of the tools provided will win the day when the next main fleet action becomes an actuality. Let us have faith in our brains and our tools, use them both, and then all will continue to be well with the navy.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SUPPLY CORPS SCHOOL OF APPLICATION

By Lieutenant Commander K. C. McIntosh, S. C., U. S. N.

The beginning of the fiscal year 1922 saw the start of an enterprise which has for many years been a dream of many officers of the supply corps. Schools of Application have been held in the past but they were convened for the purpose of instructing assistant paymasters newly commissioned from the ranks or from civil life in the use of blank forms and the routine of their seagoing disbursing duties.

I have the honor to be a graduate of the first of these schools. Twenty-three officers were commissioned in the corps from civil life on the same day. The "seagoing office boy" method of instruction could not at that time be applied to such a large class; and the school was established August 1, 1905, the course continuing a little less than two months. The pressing thing was to give us some knowledge of the mechanism of a gunboat pay-office, for we were all, of course, bound for sea at the first opportunity. At the end of the course we had acquired considerable practical knowledge on a small scale—of theory we had none. Such schools, like a certain well-known magazine, were convened "every little while" during the next fifteen years, as need arose. They fitted the new officer to understand what his more experienced pay clerk was talking about, and taught him how to check up his yeoman. Of his paramount duties in later years as a supply officer, practically no mention was made and no instruction was given.

The School of Application now in session is built upon an idea basically different. The business side of the navy surpasses, in its vastness, any existing corporation, and in its diversity, partakes of the nature of practically every enterprise in the commercial world.

Modern business is not done by rule of thumb. More and more it is a matter of applied theory, of constant study of cause and effect and of application of the results obtained to conditions which, while ever changing, are constantly recurrent. Today there is a large and almost daily increasing number of industrial concerns who base their program for future activity upon the reports of economists. The business history of the last two years is the history of distress and failure of the manufacturers and wholesalers who plan from day to day; a history of success and increased business for those who knew and followed the invariable pendulum swing of the business cycle.

Commander Karker's brilliant article in January PROCEEDINGS stressed the importance of seasonal buying of dry provisions and tinned fruits and vegetables. In this one item knowledge of the proper time to buy *next year* saves the navy thousands of dollars annually; and yet provisions are but one comparatively small group of the navy's commercial activities. The standard stock catalogue alone lists over thirty thousand items. The standard stock catalogue itself is the product of theory well digested, for each item included therein represents careful standardization of probably ten or more sizes and patterns previously bought retail at full retail prices.

Store keeping at navy yards is a vastly greater thing than the mere placing of stock on the shelves plainly marked and accessible for issue. A balanced stock can be attained only by accident unless its need is foreseen, its amounts ascertained by careful comparison of past activity and future policy and its procurement timed to hit the bottom of the market. Through the painstaking study and self-education of some of the senior officers of the supply corps, the purchase and supply of the navy has become nationally known and respected; and business in general is now counting on the navy both as a safety valve and an index. Business knows that the navy buys at the bottom and the navy purchases are frequently sufficient to check a disastrous tumble after the sane normal bottom has been reached, amounting as they do to hundreds of millions of dollars annually.

On many occasions the navy has been required to handle the financial affairs of foreign countries; and at such times invariably the fiscal and currency problems involved have been aggravated

by revolution, inefficiency and peculation to an extreme degree. Knowledge of finance, taxation and revenue, banking and currency are demanded; and here a mistake in judgment causes distress to an entire people. The currency and exchange problems of Haiti, for example, were called insoluble by civilian experts, yet Captain Conrad was able to help Admiral Caperton solve them. In the future, such problems are bound to appear again; and only by knowledge and preparation in advance can the business corps of the navy prevent criticism of naval administration and serious loss to the people concerned.

Up to the beginning of the world war the individual effort of ambitious officers of the supply corps raised navy business to this level and held it there. War multiplied navy business, increased navy demand both in volume and variety, depleted the number of officers who were masters of their profession, and brought into the corps a large number of juniors who, although practical men, were mostly without comprehension of the fundamentals upon which their profession stands. The officers of the corps commissioned since 1916 outnumber those commissioned prior to 1916; and at this time the present standard of navy business demands that not half but all know the theories and fundamentals which shape the navy's business policy. The Supply Corps School of Application is for the purpose of indoctrinating these officers.

The first class of twenty-five officers was convened July 11 and was graduated October 29. This seems an excessively short period of time. However, in the schoolroom itself, seven actual hours per day are put in and two hours of reading are required at night. In addition the student must spend still further time arranging and classifying his lecture notes in collateral reading and in preparing a thesis on an assigned subject. A fair estimated average of the applied time of each student during the course is a thousand hours—the known minimum is nearly eight hundred hours.

Viewed on the basis of hours, the school's program is still a remarkably ambitious one. The definition of logistics—"that branch of military science embracing preparation for war and including all details of supply and transport up to actual battle"—is a statement of enormous scope. Back of accounting, purchase, supply, clothing, and commissary, must come office and plant

management; back of disbursing must come banking and finance; back of transfer of men and commodities must come railway traffic and ocean transportation in all their legal and technical phases. And still further back of them all must come an understanding of business cycles and economics in its broadest sense. Naturally anything like a complete review, even in the most condensed form is impossible in one thousand hours. But it is possible to teach fundamentals, to renew habits of study and to create an enthusiasm and desire to keep on which will inspire each officer to continued study along sound and necessary lines.

Such concentrated instruction cannot be hastily prepared if it is to be of value. Foremost among our tools are those marvels of studious concentration—The Alexander Hamilton texts. In addition a carefully selected library is slowly growing. The great asset of the school, however, is the caliber of the lecturers from outside the navy who have heartily assisted and are giving us of their best. The twenty-six lectures of the course in banking are written and delivered by presidents and officers of a dozen leading banks. Foreign commerce and transportation have been treated by railway officials, steamship company presidents, officers of the Pan-American Union and university professors. Teachers who are nationally and internationally known have contributed to make the school a success, such men as Dean Wallace B. Donham, of the Harvard Graduate School, Dr. C. W. Gerstenberg, of New York University, Dr. Jacob H. Hollander, of Johns Hopkins, Dr. Roy S. MacElwee, of Georgetown University, Dr. James Brown Scott, president of the American Society of International Law, and Dr. L. S. Rowe, of the Pan-American Union.

Broadly speaking, the course has been divided into three major subjects which run simultaneously through the entire period of lectures. Accounting is, of course, the first, and twenty hours are spent in lecture and laboratory work under the direction of Mr. John Berg, B. C. S., M. C. S., C. P. A., a member of the faculty of the Washington School of Accountancy. From this as a basis, officers and civilians, who have built up the navy's accounting system, extend the instruction along naval lines of title and appropriation accounting, cost finding and cost inspection. The second fundamental is banking. The base course is arranged

by President V. B. Deyber, Second National Bank; Mr. Howard Moran and Mr. A. C. Flather, American Security and Trust Co.; Mr. Edward McQuade of the Liberty National; Mr. Joshua Evans, Jr., and Mr. Robert Fleming of Riggs National; Mr. Chas. Boyer, of the Federal National; Mr. F. G. Addison, of Security Savings; Mr. E. H Thomson, of Washington Loan and Trust, and many others. From this series of twenty-six lectures covering banking fundamentals grow a number of branches by bureau officials, collateral reading and talks by authorities on foreign exchange. The third major subject, transportation, extends from the actual shipping papers back to the legal precedents which require their use. Particular attention is, of course, devoted to military transportation requirements in peace or war both afloat and on the beach. Behind these three majors and linking them together there is a continuous study of economics and the fundamentals of finance.

At the end of the course in addition to submitting his thesis each student has visited and thoroughly inspected the activities of the navy yard, the Bureau of Supplies and Accounts, Comptroller's office, Veteran's Bureau, a meat packing plant, at least one bank in the District of Columbia and the office of an investment company. In addition, his Saturday afternoons have been employed in inspecting the public buildings, historical monuments, libraries and art galleries of the Capital.

Altogether the course is no child's play, but it has been tackled with enthusiasm, and it is getting results. These results in the way of economy and business and military efficiency to the navy are not transient things; and the future benefits to the navy business and reduction of costs will be almost limitless.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

MAINTAINING YOUTH IN SERVICE

By Walter Aamold

Department of Physical Training, U. S. Naval Academy

Strange enough—it was a mariner, Ponce de Leon, who first worked up the idea of maintaining youth beyond the gay fleeting years that pass only too quickly.

Centuries before daring seamen had set out in search of the "Golden Fleece," a short cut to wealth; and in later years Cortez, in a less romantic way, actually laid hands upon such a fortune—but it remained for Senor de Leon to show the way to a greater wealth, and perhaps men are now just beginning to get a practical grip on the "atomites" that cause early age.

There must have been many a gray-haired champion of old Spain who each day tottered to the edge of the sea to lean upon a gnarly cane and search the horizon for the return of the white winged ships of hope. But like many a pioneer, Ponce never came back. However, his idea nestled dangerously close to the human heart and the old mariner's sincerity clinched a hope for time and a day—eternal youth!

Science following upon the wake of this illusionary leader has found the right spring, and a number of fundamental laws of life have been brought to the surface since 1512. The fountain of youth can be made to bubble just a little longer in the lives of men who are sincere and who hold to the rules set before them.

Now, so long as an officer may look ahead to "fogy" pay, there is some incentive for his wanting to live up to the full limit of its application—and, with a ten-year naval holiday in addition, it may be necessary for an ensign to put off old age indefinitely in order to have strength enough to grip his commission as lieutenant when it is presented him.

Man's March Across the Horizon.—A man's physical age is divided into two distinct periods: the "age of elasticity" and the "connective tissue age." Between the two there is a twilight period of variable duration, dependent upon individual characteristics. Likewise, there are two mental ages: "age of daring" and "age of conservativeness" with wind and water between.

A "connective-tissue mind" anchored to an "elastic" body arrests development to both. There are many unfortunate combinations between mind and body, and of course there are some very beneficial combinations as well.

Reversal of Conditions Afloat.—Experts have stereotyped into every language except the one that reaches a man's disciplinary conscience, that exercise is essential to elasticity. Ah!—That same old story about exercise!! Humble as it is, fifteen minutes of exercise daily—goes begging.

This short period will perform two of the wonders Ponce sought—for it maintains elasticity and eliminates the factors of deposit that turn lithe muscles into stiff, shortened, dried-out fibers of the body. Exercise preserves the essentials of youth—elasticity, suppleness, tone; the foundations of grace, energy, and physical ambition. The hope, like a mariner's morning, could not be more rosy!

Officers are able to talk for hours on the life of a gun or the elasticity of steel, but in these absorbing interests do they give thought to the life of elastic usefulness that is their part in the service?

Duty afloat seems to reverse the factors of age. A careful analysis will show that conditions which age the civilian are the very ones that maintain an officer's youth.

Where a civilian drinks polluted well water, alkali combinations not fit for washing the boiler of a tug, or city water saturated with chlorine, the service has at its disposal (minus submarines and certain destroyers) properly distilled water. This comparison may be continued through air, food, sunlight—the balance always favors the officer. But—on the port hand, an officer is on duty always, his hours are made irregular by years of night watches, he is exposed to weather just as "she blows" when at sea, he is kept mentally alert for unusually long periods as commanding officer, navigator, and in the many other divisions of authority

which carry direct responsibility. And, it must be admitted, too, that by virtue of an officer's social position in the nation, and the sliding scale of pay, he is often brought face to face with trying financial conditions that have no equal for bringing on gray hair.

On land a civilian stretches his legs in his daily efforts—he has clubs, golf links, recreation centers, theatres and most important of all, a home to sweep away the grit from his bread and butter.

An officer in active service sleeps and eats with his profession, and is forced to receive his domestic heritage in a weekly letter from home.

On graduation an officer enters sea service with a constitution that is as solid as the foundations of a turret; attached to his commission, however, is a little joker. Up to the day of graduation he has been a "land lubber" despite his summer cruises, and his mind is set in a land-locked way.

Graduation sends him to sea in an element only natural to fish, and he is forced to live within the covers of the regulations and pay table. The habits of *relaxing, exercising, playing,* are replaced by a continual alertness, very often somewhat strained; confinement and a somber dignity essential to discipline.

What has been stated is not in any way a criticism—it is but a brief outline of conditions as an officer faces them. Many of the conditions are necessary to service, and for these the nearest counter measures must be found.

Three rules may now be given:

Fifteen minutes of exercise each day.
Definite periods of relaxation.
An energetic, youthful frame of mind.

When a captain feels that he can no longer exercise at all, play golf, go hunting, or completely relax from his duties, he has become a "fixed star" and he has grown mentally old at least. If his muscles are becoming rigid, his joints stiff, eyes dim, and his carriage is settling like the keel of his ship, he is on the road to a physical old age and heroic measures are necessary.

Emerson has said that a field cannot be seen from within the field. Neither may a man see that he is growing aloof from the things which keep him young; for example an occasional dance,

light banter at the table, a good night's sleep, an efficient day of work, and perhaps a game of golf or hand-ball. The morning "growl," noon "fatigue" and evening pains of "gout" are the three Furies of old age.

Fortunately, Nature in her wisdom allows faults that have extended over years to be corrected, and nothing can be more beneficial than a correct frame of mind and moderate exercise. The subject of re-building is too long to be given here, since this treats with a difficult enough subject as it is; however, a brief outline of beneficial measures, extracted from a previous article, is included herein as being directly necessary to maintaining physical fitness and mental youth.

Recent tests on officers in the postgraduate department gave evidence that officers in general suffer marked loss of strength after graduation, particularly in the largest and least actively employed muscles, with greatest defect in neck and trunk.

Not only was there a loss of actual contractile power (forerunner of connective-tissue age) but also a loss of the ability to apply muscles to their full efficiency (loss of tone). In addition to loss of muscular strength, there was a loss of *habit* of using these muscles which implies a loss of "form" and co-ordination. The conclusions to be drawn are self-evident: only by daily, well-regulated exercise can the personnel maintain a good standard of muscular strength and bodily efficiency.

Forms of Exercise.—The daily program of exercise should be greatly varied. In the case of the man of middle age, whose heart, lungs and muscles have habituated themselves to a certain range and rhythm, there must be reasonable care, not so much in the kind of exercise indulged in, but rather in the strain involved and duration of strain.

All-Around Participation.—It is better to become interested in an all-around group of sports and exercises than to specialize in one particular branch. The man who concentrates on one subject is very apt to become engrossed in its competitive features and the worry of winning and depression of defeat often become factors which destroy the benefits of the exercise.

Over-Fatigue and Normal Fatigue.—Fatigue which lasts beyond the next day, or which brings about a rise in temperature and bodily discomfort has been excessive. If it is localized in the

muscles used and passes away by the next morning, it is to be encouraged.

Rope Skipping.—This exercise is for developing the arms, legs, lungs and trunk muscles and is excellent in bringing about good co-ordination. Skip three one-minute rounds. Always skip on the toes and vary the footwork as desired.

Relaxation Exercises.—Stretching exercises and exercises in which the movements are free, aid in developing and overcome the stiffening and shortening of muscles, a condition often known as "being muscle bound." Hang free from the deck, swing trunk and legs; then stand on deck and swing arms loosely, twisting shoulders, head and trunk without resistance. All relaxed moves are excellent for keeping the body supple.

Medicine Ball.—Throwing the medicine ball develops the muscles of the back, shoulders and arms, and is excellent in relieving constipation. Throw ball from various positions for three rounds of two minutes each.

Posture.—There is a natural tendency to laziness of posture in standing and walking which can only be overcome by a determination to live up strictly to the best form and to give constant attention to corective measures. The average posture is faulty, and an ideal posture can not be obtained without careful training and discipline.

A faulty posture brings about pressure against the base of the brain, throws the vital organs out of position and permits a weakening of trunk muscles to a serious extent. The most noticeable faults are: drooping head, neck bent forward, unequal shoulders, rounded upper back with exaggerated dorsal curve (kyphosis), compensated lumbar curve to offset upper curve (lordosis), possibly lateral curvature of spine, hips drooped forward, protruding abdomen, flat feet, and most frequent of all errors—*flat chest.*

Corrective Exercises.—Constant attention to correcting parts out of line. Deep breathing combined with an effort at chest lifting. Add arms raising forward and upward during inhalation, sideways and downward during exhalation.

Mental Exercises.—Mental relaxation for at least an hour each day. Change point of interest by taking part in golf, hunting,

fishing, winter sports, or an avocation that demands full attention of the mind for a short period each day.

Above all there must be the same faith that inspired Ponce de Leon to cross the world for the ideal he sought.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

APPROACH OMNIMETER

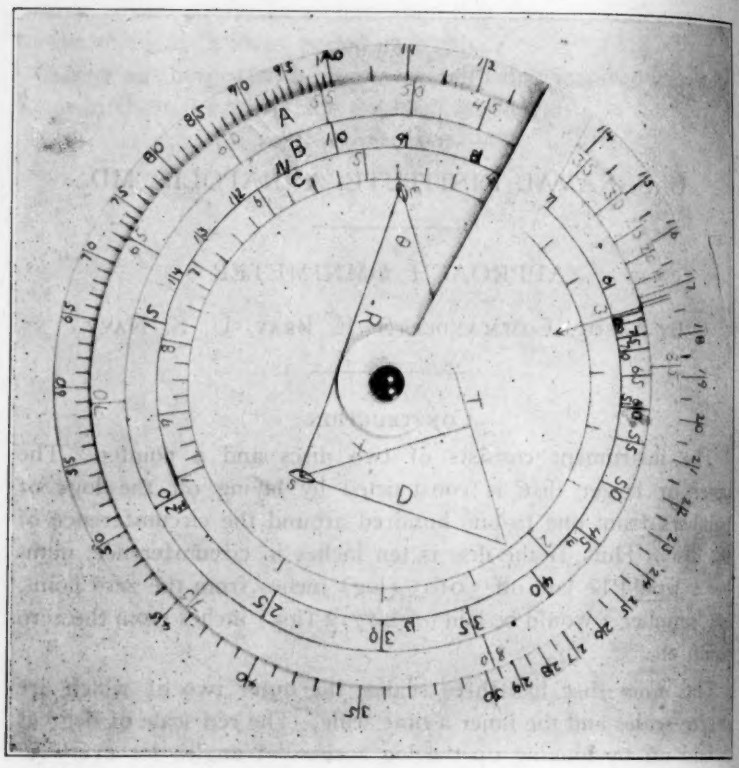
By Lieut. Commander S. E. Bray, U. S. Navy

Construction

The instrument consists of two discs and a pointer. The outer or larger disc is constructed by laying off the logs of numbers from one to one hundred around the circumference of the disc. Thus, if the disc is ten inches in circumference, number 2 would be laid off 3.0103 (log) inches from the zero point, etc., number 3 would be laid off 4.7712 (log) inches from the zero point, etc.

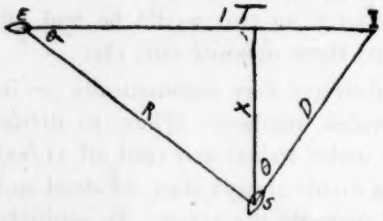
The inner disc has three scales, the outer two of which are degree scales and the inner a time scale. The red scale of degrees is laid off by looking up the log cosines of angles for every 5° from 0° to 90° and plotting the line opposite the amount indicated on the outer disc scale. The black degree scale is similarly plotted but taking the log cosecants as factors. The time scale is laid off by dividing 3 by different times from one minute to ten at 15 second intervals. Thus, $3 \div 1 = 3$, so one would be laid off opposite 3 on outer disc; $3 \div 2 = 1.5$, so two would be laid off opposite 1.5 on the outer disc and three opposite one, etc.

The instrument adds and substracts logs automatically or in other words multiplies and divides numbers. Thus, to divide 10,000 by cos 30° place red 30° under 10,000 and read off 11,600 opposite the arrow. Therefore to divide always place dividend and divisor in coincidence and read opposite the arrow. To multiply 10,000 by cos 30°, place arrow under 10,000 and read off opposite red 30°. Therefore to multiply place red arrow under number and read off opposite the degree mark used.



A=Red Circle
B=Black Circle
C=Time Circle

THEORY



THEORY

Considering the approach triangle ESI a right triangle with,
R=Unity=Range
T=Distance enemy must run.
D=Distance sub must run.
X=Shortest distance to enemy track.
θ=Angle on the bow.

Cos θ=R÷T, T=R÷Cos θ; Sin θ=D÷T, Sin θ T=D. But Sin θ=1÷Csc θ. Therefore D=T÷Csc θ; Cos θ=X÷D, Cos θ D=X.

OPERATION

To find "R"

(a) Nautical eye.

(b) Range finder.

(c) Telemeter scale.

The first and second methods require no comment. Range is found by the third method as follows:

After setting enemy abeam (or before) estimate what type of ship it is. Knowing the type, the length will be known within very close limits as ships in all navies are approximately of the same lengths taking them type for type. Then estimate the angle on the bow Θ and also take the number of degrees the enemy subtends on horizontal telemeter scale. If you are not abeam of the enemy you cannot see all of his length, that is the total length of the enemy will not be projected on the telemeter scale. So the telemeter reading must be multiplied by a number depending on the value of Θ. To obtain this number put the zero lines of both discs in coincidence and place pointer over black mark agreeing with estimated angle on the bow. The multiplier is picked off the outer disc under the pointer.

For example suppose the C. O. estimates the enemy to be a modern battleship, he knows then that her length is about 600 feet. Angle on the bow estimated to be 30° and enemy subtending 1.2 on the telemeter scale. Place zero lines of discs in coincidence. Place pointer over black 30° and it points to 2. Multiply 1.2 by 2 and get 2.4, the number of degrees the enemy would subtend were you on her beam. Look up range in table. In this case 10,000 yards.

LOW POWER 1.5, 25 feet =1° at 1,000 yards.

Enemy Length	RANGE									
	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
250	10	5	3.3							
300	12	6								
350	14	7								
400	16	8								
450	18	9								
500	20	10								

Enemy Length	RANGE									
	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
550	22	11								
600	24	12	8	6	4.8	4	3.4	3	2.66	2.4
650										
700										

(Table should be made out for 50 ft.=1° at 1,000 yds., but it serves for this illustration.)

To find T=Distance enemy must run.

Place red 30° under 10,000 and read 11,600 on the outer disc opposite arrow on inner disc.

To find D=Distance submarine must run.

Place black 30° under 11,600 on the outer disc and read 5,775 oposite arrow on the inner disc.

To find X=Shortest distance to enemy's track.

Hold arrow on 5,775 and read off opposite red 30°, 5,000 on outer disc.

SPEED

1. To find the speed the enemy must take to stay abeam of the submarine, place the arrow under the speed of submarine, on outer disc and read off opposite the angle on the bow black angle. Thus, if the submarine is making 9 knots and angle Θ being 30°, place arrow under 90 on the outer disc and read off opposite 30° and you will get 18 knots.

2. To find speed if enemy draws ahead or astern.
Method "A"—using red angles only.

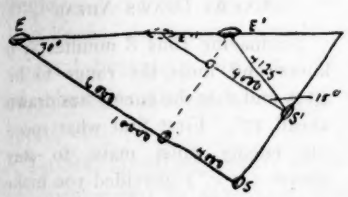
Factors used in this method are as follows:

1. Time interval between ranges (known).
2. Change in enemy bearing (known).
3. First and second ranges (approximate).
4. Angle on the bow (estimated).

So far the following data has been used:

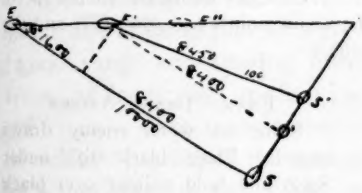
Angle on the bow 30°
Range 10,000 yards
Submarine speed 9 knots

and it will be used throughout this explanation. Also the time interval will be taken as 8 minutes.



ENEMY DRAWS AHEAD

Suppose the sub having found the initial range to be 10,000 yds., angle on bow 30°, runs along for 8 minutes and then takes an observation and finds range to be 4,125 yds. and the enemy to have drawn ahead 15° (in getting multiplier for telemeter scale use 45° for angle on the bow has increased 15°). If enemy had maintained an intersecting speed he would have been at E″ but he is really at E′. Angle E′S′E″=15°. Place arrow under 4,125 yds. and read off 4,000 yds. opposite red 15° equal to S′O. Subtract this from 10,000 getting EO′=6,000 yds. Place red 30° under 6,000 and read off 25.95 knots opposite 8 minute mark on time scale.



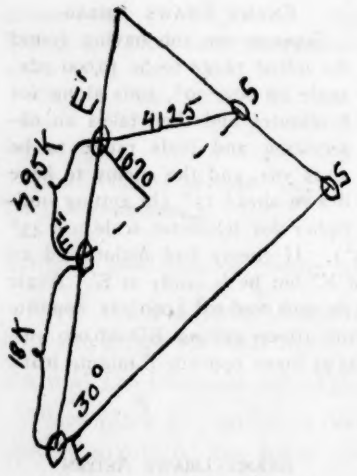
ENEMY DRAWS ASTERN

If enemy draws astern the procedure is the same. Enemy draws astern 10°, range 8,450 yds. (use 20° in finding multiplier). Place arrow on 8,450 and read 8,400 opposite red 10° mark=EO′. Place red 30° under 1,600 and read 6.95 knots equal enemy speed opposite the 8 minute mark.

3. Method "B"—using black angles only.

The following factors are used:

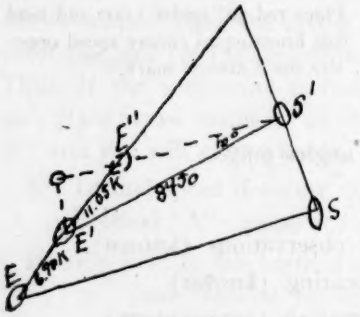
1. Time interval between observations (known).
2. Increase or decrease bearing (known).
3. Range at second observation (approximate).
4. Angle on the bow (estimated).
5. Submarine average speed during interval (?)



ENEMY DRAWS AHEAD

Submarine runs 8 minutes at 9 knots and finds the range to be 4,125 and that the enemy has drawn ahead 15°. First find what speed the enemy must make to stay abeam (at E″) provided you make 9 knots. Place arrow under 90 and pointer over black 30° reading 18 under pointer on outer disc= E″E. Then place black 15° under 4,125 and put pointer over black 30°. Hold pointer in place and put arrow under pointer. Read off opposite 8 minute mark 7.95= E″E′. Add 7.95 to 18 getting E′E=25.95 knots, the enemy speed.

(In placing black 15° under 4,125 the arrow points to 1,070=E′O and the black 30° points to 2150=E′E″ in yards.)



ENEMY DRAWS ASTERN

Same as when enemy draws ahead. Place black 10° under 8,450 and hold pointer over black 30°. Turn arrow under pointer and read off opposite 8 minute mark. Subtract this from 18 getting EE′=6.95.

ADDENDUM

Submarine starts approach with enemy forward or abaft the beam. Take 10° for example.

Find "R" as before.

Find "X" assuming enemy is abeam.

Find "D" from "X" using angle bow equal θ+10° or θ—10° according to whether enemy is abaft or on forward of the beam.

To find speed to keep enemy on constant bearing:

Instead of placing arrow under submarine speed and turning pointer over black angle on the bow place (in this problem) black 80° under submarine speed and turn pointer over black

angle on the bow. If angle on bow is 30°, and submarine speed is 9 knots, the enemy would need to make 17.6 to maintain the original bearing constant. If enemy is 20° forward or abaft of submarines beam black 70° would be placed under submarines speed, etc.

To find speed of enemy if he draws ahead or astern. First find enemy's speed to maintain constant the original bearing as explained in the above paragraph. Find E″ E′ as in method "B" and add or substract from 17.6 as the case might be.

The approach omnimeter will aid the navigator of a submarine or other vessel when it is desired to pass a certain object at a given distance abeam. Suppose for instance, that the captain of a vessel coming into port wishes to pass the end of a dock at a distance of two hundred yards on his port hand vessel on course 0° dock bearing 20° on the port bow. Take range with range finder and at same time observe relative bearing. Suppose range 14,000 yards and bearing now 25° on port bow. Place red arrow of inner disc under 14,000 and read under 200, 82° on red circle. Take complement of 82° which is 8°. Therefore the relative bearing of the dock at the time of taking range should be 8° in order to pass dock abeam distant 200 yards. Hence course will be changed 17° to left immediately and the same operation gone through again until the relative bearing of dock agrees with bearing obtained from omnimeter.

The writer during short range battle practice of the *Charleston*, spring, 1921, used this method entirely in making approaches for each run. He took his station at the standard compass and had direct communication with the range finder. All his attention was given to maneuvering the ship and seeing proper signals given for commence and cease firing. During the whole practice it was unnecessary to take a pencil or manipulate a parallel ruler. After inspecting the target we would stand down astern for about 2,600 yards and then turn to course paralleling the targets bringing target on the side from which we were to fire. A simultaneous range and relative bearing would be taken and this bearing checked with the bearing obtained from the omnimeter. We endeavored to pass target abeam distant 1,600 yards. Suppose first range was 2,800 bearing 25° port. Place red arrow under 2,800 and pick out under 1,600 55°. 90°—55°=35°. Therefore

35° is what target should bear at this range in order to pass it on parallel course at 1,600 yards range. The observed bearing was 25° so the ship is inside 10° and it will be necessary to sheer off to the right. To find distance inside place black 25° under 2,800 and read 1,180 under red arrow. 1,600—1,180=420 yards.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

A PROGRAM FOR NAVAL HISTORY

By Captain J. M. Scammell, Inf. R. C., U. S. Army;
Technical Assistant, U. S. Naval War College

List of Works and Articles Consulted

I. *Naval and Military Essays—Cambridge Naval and Military Series:*

1. Corbett, Staff Histories.

2. Hale, The Difficulties Encountered in Compiling Military History.

3. Maurice, The Value of the Study of Military History as Training for Command in War.

II. *American Historical Review:*

1. January, 1921: A Caution Regarding Military Documents.

2. July, 1919: Magoffin, Historical Work by General Staffs.

3. July, 1919: Taylor, The History of the War of 1917.

4. October, 1912: Leland, The National Archives; A Program.

5. April, 1911, July, 1911: "A British Officer," The Literature of the Russo-Japanese War.

6. January, 1907: "A British Officer," The Literature of the South African War.

III. *Journal of Royal United Service Institution:*

1. August, 1921: Dewar, The Necessity for the Compilation of a Naval Staff History.

2. August, 1921: Sturdee (a discussion of the preceding).

IV. Langlois and Seignobos, *Introduction to the Study of History*. New York, Henry Holt and Co., 2nd Edition.

V. Various Official Histories and other Official Military and Naval Publications in the Library of the U. S. Naval War College.

In view of the traditional military policy of these United States to neglect preparation against the coming of war and in times of peace to starve the military and naval establishments, there is little that the navy department or the war department can do toward securing a high degree of military efficiency. But there is one precaution that can be taken, and that is one of supreme importance; to raise the standards of leadership to the highest possible degree of excellence. In securing this, no factor is of such fundamental importance as an intelligent use of history.

The value of military history is no longer a matter of controversy; that value is now universally recognized and its standing is established. But we cannot get the most out of history unless all its various uses are clearly understood and a definite policy for its fullest exploitation is adopted. It is proposed here to set forth these various employments, to describe briefly the development of staff histories, to describe the types, methods and sources and to suggest a policy whereby the most effective use can be made of our historical sections.

It was nearly a century ago that the value of staff histories was first recognized when, from 1824 to 1847, officers of the Russian general staff published an official history of the Seven Years' War.[1]

Magoffin gives as the next steps a *History of the Operations of 1812* by the Russian General Staff[2] and the campaign of 1859 in Italy by the *Dépôt de la Guerre*, published in 1860. However, if the latter be considered a staff history, it is only fair to accept as the second step the *History of the Campaigns of the Emperor*

[1] *Geschichte des Sieben Jahrigen Krieges, von den Offizieren des Grossen Generalstabes.* See Magoffin, "Historical Work of General Staffs" in the *American Historical Review*, July, 1919. Mr. Magoffin's footnotes form the basis of a valuable bibliography of staff histories.

[2] M. Bogdanovich, *Geschichte des Feldzuges im Jahre 1812, nach dem Zuverlassene Quellen, auf Allerhochsten Befehl.*

Napoléon, 1805-1809, published as a "Mémorial" 1843 by the *Dépôt Général de la Guerre.*[3]

But the modern staff history had its origin with the appearance of the campaign of 1866 in Germany and the Franco-German war, both by the military history section of the Prussian great general staff[4], and the Golden Age of staff histories was in the decade preceding the world war when such wars as that in South Africa and the Russo-Japanese war were fully described by all such staffs as had historical sections, and accounts and criticisms of previous wars were published also. The foremost historical sections were: The military history section of the Prussian great general staff[5]; the historical section of the general staff of the French army[6]; the Military Commission of the imperial Russian supreme staff[7]; and the historical section, committee of imperial defense in Great Britain. The Esher committee failed to establish an historical section in 1904. However, in 1908 this duty, together with that of writing naval staff histories, was given to the C. I. D.

A comparaive study of the methods in various countries together with a study of present developments and tendencies will enable us to profit by the experience of others. The most noteworthy departure was the German practice of publishing monographs. This example is now very general. Another method of work is that followed by the British in producing an official history of the war in South Africa: it was written "by direction of his Majesty's Government" by the distinguished military historian, Major General Sir Frederick Maurice. In France a similar practice has long been very common: *Redigé sous la direction de l'État—Major de l' Armée, 2e Bureau* or *Publié sous la direction de la Section Historique.*[8]

[3] *Histoire des Campagnes de l' Empereur Napoléon, 1805-1809; Mémorial du Dépôt Général de la Guerre,* 1843.

[4] *Der Feldzug von 1866 in Deutschland; Der Deutsch—Franzosische Krieg, redigiert von der Kriegsgeschichtlichen Abteilung des Grossen Generalstabes.*

[5] *Kriegsgeschichtliche Abteilung Grossen Generalstabes.*

[6] *Section Historique de l'État—Major de l'Armée.*

[7] *Kriegsgeschichtliche Commission des Kais—Russischen Haubtstabes.*

[8] Examples are:
Colonel Desbrière's *Projets et tentatives de débarquement aux Iles Britanniques,* 1798-1805; de la Jonquière's *L'Expedition d'Egypte,* 1798-1801; Balaguy's *Campagne de l'Empereur Napoléon en Espagne,* 1808-1809.

A third interesting development was the beginning of a combined military and naval official history of the Russo-Japanese war by the committee of imperial defence.[9] This was begun by the general staff, war office, as a military history and Volume I was published as such. However, beginning with Volume II it continued as a combined naval and military account.

Such were the tendencies before the war; how were they represented in our own country? The answer is, of course, that they were not represented at all. To parody the famous words of John J. Jones: "We had not yet begun to write."

While other states were producing staff histories the military literature of the British and the Americans had types all their own. For just as our cousins adhere to the system of refusing to prepare beforehand against war so as to forestall failure, and prefer to investigate afterwards into the causes of failures, so also do we. It would be as humiliating as it would be tiresome to give a long list of examples of the resulting literature; a few will suffice to indicate the type of material referred to.

The Report of his Majesty's Commissioners appointed to inquire into the Military Preparations and other Matters Connected with the War in South Africa; The Report of the Commission appointed by the President to Investigate the Conduct of the War Department in the War with Spain; The Report of the Dardanelles Commission, and the Report of the Senate Naval Investigating Committee. Nor must it be imagined that this kind of material is useless; it has at least one very great value: it supplies copious accumulations of information from which innumerable books may be written on "How not to conduct war."

During the period when the wicked general staffs were producing their "militaristic" literature, with our customary virtue we were engaged in publishing our own military records in such a manner as to render them useless for any warlike purpose. The *Records of the War of the Rebellion* were printed at a monumental cost. What could have been and should have been a priceless collection was turned into an abortive effort because the publication being a political maneuver and not a scholarly or a

[9] *Official History of the Russo-Japanese War (Naval and Miltiary) prepared by the Historical Section of the Committee of Imperial Defence, London, H. M. Stationery Office,* 1910.

military undertaking, was entrusted neither to scholars nor to military men, but political appointees. The manner in which such things are done by our government is in exasperating and pathetic contrast with the intelligent methods of any other state. One of our collections bears this notice:

"Edited by the Clerk of the Joint Committee on Printing."

All the eloquence of a Webster, a Burke, a Cicero, a Demosthenes or of a Blanton could not more completely damn our methods than that one simple inscription. Governments knew better than that before the first Pharaoh. Unofficial military history was in almost as ludicrous a state. Comparable in futility with the *Records of the War of the Rebellion* are the ponderous labors of Colonel Dodge—worse than useless: historically false.

However, we have improved. But even the British preceded us. In 1884, before they had a general staff the quartermaster general's department published *British Minor Expeditions*. About 1901 our military intelligence department of the adjutant general's office published an account of the *Military Operations in South Africa and China*. Then came the British official history. After the Russo-Japanese war the war office printed *Reports from British Observers Attached to the Japanese and Russian Forces in the Field*. This was an account of military operations. Our own *Reports of Military Observers Attached to the Armies in Manchuria during the Russo-Japanese War* while not strictly military history, contained valuable material, especially on arms, equipment, organizations, etc.

About this time the navy department became dimly aware that there was something called naval history, and O. N. I. published *Notes on the Spanish-American War* while the bureau of navigation issued *Naval Operations of the War with Spain*. These are valuable mainly because they indicate a beginning. They do not compare with the *Naval Operations of the Russo-Japanese War* by the Japanese naval staff.[10] On the other hand, the British began their official history by the committee of imperial

[10] *Opérations Maritimes de la Guerre Russo-Japonaise, Historique Official publié par l'État—Major Général de la Marine Japonaise, traduite par Paul Monconduit Enseigne de Vaisseau*, Paris, R. Chapelot, 1911.

defence and the Japanese naval historical section had published 130 volumes on the Russo-Japanese War.[11]

Since the world war activity has begun once more in the historical sections. In Germany the *Admiralstab* is preparing a naval staff history under the superintendent of the marine archives. It is to include five sections as follows:

1. War in the North Sea.
2. War in the Baltic Sea.
3. War in the Black Sea.
4. Cruiser Warfare.
5. Submarine Warfare.

In France the naval history section, which was organized in the bureau of operations in 1910, had been absorbed. By a decree of July 19, 1919, a new historical section of four bureaus was established under the direction of Captain Castex.

In the British admiralty, immediately upon the outbreak of the world war, on August 4, 1914, the naval history section was organized.[12]

Sir William Slade and Sir Julian Corbett were asked to take charge. They were given about ten officers and a large force of clerks and an entire building was set apart for their use. There, copies of all reports were sent. These were studied and from them an account of the operation written. Galley-proofs were sent for criticism to those concerned and the result formed the basis of the official narrative. Of so much importance did the British regard military and naval history, and thus intelligently did they go about its preparation.

So too, when General Pershing set up his headquarters at Chaumont, he had on his staff our most distinguished—our only distinguished—military historian, the late Professor R. M. Johnston. The historical section of our war plans division, general staff today, has cause to bless him, and work there is proceeding on intelligent lines. And similarly, when war was declared, Admiral Sims in London had not failed to recognize the necessity of a complete record of our naval activities, nor had he failed

[11] Captain Alfred Dewar, O. B. E., R. N. (retired), B.Litt. (Oxon), "The Necessity for the Compilation of a Naval Staff History," in the *Journal of the Royal United Service Institution*, August, 1921.

[12] Admiral Sir F. C. Sturdee, R. N., in the *Journal of the Royal United Service Institution*, August, 1921, page 382.

to note the efficiency of the admiralty historical organization. He submitted a complete report and strongly urged that an analogous organization under a trained and competent historian be started in Washington. No action was taken upon this recommendation. It was repeated some months later with the result that permission was granted that such a section be established in London. This was done at once. Captain Knox was placed in charge. His force grew to include thirteen officers and a hundred clerks. These went over a hundred file cases of four drawers each, selecting, classifying and cataloguing materials. Twenty cases of classified and completely indexed documents were sent to the navy department. The full significance of this work can be appreciated only by a historian.

To digress, to point a moral and to adorn a tale, to show how, sometimes, virtue is rewarded even in this world, it was this scientific arrangement of material that enabled Admiral Sims, during the senate naval investigation, to put his hands immediately upon any desired document to substantiate his statements and to prove his contentions; this to the surprise and to the confusion of his enemies, while the files of the department were in chaos.

The use to which the materials thus variously collected have been put forms an interesting contrast. Sir Julian Corbett has published "by direction" of the admiralty two volumes, admirable in all respects except that he does not and cannot quote his sources; for the admiralty still holds many documents confidential and disclaims any official responsibility for Corbett's statements. Our general staff historical section has projected a very intelligent arrangement:

1. General Military History of the War.
2. Diplomatic Relations.
3. Economic Mobilization.
4. Military Moblization and Supply.
5. Military Operations.
6. Military Occupation.

The first two volumes have already appeared. These are: *Field Orders, 1918, 5th Division* and *Field Orders, 2nd Army Corps*. Very wisely the publication begins with group five and there are no comments. This is quite sound. However, in ad-

dition to these short tactical studies have appeared such as: *Monograph No. 4, A Study in Troop Frontage.* The naval historical section has also produced two monographs: *Publication No. 1, German Submarine Activities on the Atlantic Coast of the United States and Canada,* and *Publication No. 2, The Northern Barrage and Other Mining Activities.* These are by no means admirable even for first efforts. Whatever other reasons there may be, this much is clear, that the result shows no precise conception of the rôles of military history; the volumes are designed to serve no definite purpose. This matter needs clearing up before proceeding further.

From Maurice, Corbett, Wilkinson, from our own Mahan, and from a host of others, we have come to concede universally the value of military and naval history. It is now the fashion to exalt its benefits. Corbett says:

> The main question with regard to staff histories is no longer concerned with their value or purpose; it is concerned rather with the best means of producing them, the best means, that is, of getting from them the desired results.

This cannot be done until we have a definite idea of its benefits. But we do not yet differentiate distinctly between these benefits. Now there appear to be three general uses. The first is to give a broad perspective and to indicate the interrelation of the widely different phases of war. The second is through historical research to gain a wider experience. The third is through analysis to deduce a doctrine of war. Vision, instruction and doctrine; these are the main benefits of military history.

Captain Dewar says:[18]

> Where then does the function of history come in? Its function is to stand aside from current business and give a clear exposition of events. . . .
>
> The navy is a business which is only occasionally actually engaged in the performance of its business, and its business is of such a nature that the people doing it do not know what they are doing in its relationship to the whole. This they can only learn from history.

Captain Dewar then quoted from Admiral Vesey Hamilton's preface to his work on naval administration:

> For myself, I learned more of the interior workings of the admiralty in the compilation of this volume than I did in five years at the admiralty.

[18] In J. R. U. S. I. quoted above.

This is the use of perspective and vision.

Sir Frederick Maurice expounds well another use:

> We require, then, a wider knowledge of war than is obtainable from practical experience even by the most fortunate, and to obtain this wider knowledge we must go to the records of past war.[14]

This is the use of training and experience.

The third use is described by Corbett as:

> . . . a mine of experience whence alone gold is to be found from which right doctrine—the soul of warfare—can be built up.

The first use yields its fruits to those who compile history, the second to those who study it, and the third is mainly designed for analysis by the staff. This is a generalization with reservations implied. One must not go too far.

Now, just as there are different uses, so also there are different types of military or naval history. There are two: the first is designed for the deduction of general doctrine for the conduct of war and the second for the deduction of tactical doctrine. These differ not only in use but in sources and methodology. The first is largely concerned with wars long past for the study of which materials from both sides and from neutral sources, and of all aspects, political, diplomatic, economic, logistic and strategic are ample. This gives a wide perspective and enables one to deduce general principles. For the study and preparation of this type, trained historians are to be preferred, because their knowledge of the general background is more detailed, their knowledge of sources is wider and because they possess critical skill and other technical advantages of their craft. Nevertheless, the advice and co-operation of military men is essential.

On the other hand, the second type requires a trained soldier or sailor to do the best work because it deals with technical details where the civilian would make many ludicrous mistakes. Even in a critical analysis of the documents a scholar trained in heuristic would be at a disadvantage, for he would know little of the conditions of fatigue, excitement, worry and fear under which many reports are often written.[15] Moreover the profes-

[14] The Japanese make a practical use of their naval historical section in this connection: The staff refers to it habitually for information regarding the class of operation projected. See in J. R. U. S. I. cited above.

[15] Historians recognize this disadvantage. See: "A Caution Regarding Military Documents" in the *American Historical Review*, January, 1921.

sional historian would hesitate to risk his reputation by dealing with a subject where materials are largely from one side only and where, even so, much is often perforce suppressed.[16] Then too the military man knows better what is desired: the search amongst the scanty documents of a recent war for indications of new tactical developments or future tendencies. But even so the trained historian or archivist could render effective aid and advice and by his knowledge of methodology save a tremendous amount of wasted time and effort.

In connection with this discussion of the types and uses of military and naval history it may be well to note a new development which broadens the scope of military history today. Modern warfare, the nations in arms idea pushed to its extreme application, necessitates the study of many new activities formerly only remotely related to war. In the United States a few of these subjects are described in popular volumes by private individuals. It is inferred from an interpellation in parliament that in Great Britain the government exercises some supervision over this work and that under its patronage and direction the following works are being prepared: by Mr. Ernest Fayle, a trade history: by Mr. Archibald Hurd, a history of the merchant navy; by Professor Sir Walter Raleigh, a history of the air forces, while Professor G. S. Gordon is writing on a military subject.

Now let us summarize the tendencies which are described above. In Great Britain a combined military and naval staff history has been published, and at present, not a merging but rather a close liaison and co-operation between military and naval historical sections has been urged.[17] In France staff histories are prepared by competent officers under the guidance of the historical section, while in Great Britain this patronage is extended to civilian historians, and, during the war, the civilian historians were placed in charge of all historical work. A further development is the present elaborate care exercised in the collection and clas-

[16] Military reputations are shielded or whitewashed and necessarily so, because leaders must be hedged about with prestige and confidence in them maintained. This is a factor of greater importance than military skill: "Unity . . . that first and supreme force of armies," as Ardant du Picq calls it, cannot be hazarded in the interests of mere tactical speculation.

[17] See Corbett in—*Naval and Military Essays, The Cambridge Naval and Military Series.*

sification of documents by historical sections, including our own. This is of supreme importance, and must be made a permanent practice. "No documents, no history," says the French scholar Langlois. In Germany this is so thoroughly recognized that the superintendent of the marine archives is a vice-admiral. Another tendency, urged in Great Britain and actually practiced in Japan, is the current use of military and naval history to check proposed operations. This practice in time of war will be invaluable. Finally the monograph has come to occupy a more definite place and to fill a distinct need. The monograph appears to be developing into a means for the speedy production of detailed accounts of specific types of operations for the practical current use of the Staff or for general instruction. These monographs can then form the basis of the general staff history. This would be a satisfactory solution of the problem whether a staff history should be published at once or whether to wait until all material can be utilized. Admiral Sir F. C. Sturdee, R. N., stated before the Royal United Service Institution:

> I therefore think it very important that this history should be published for staff work as soon as possible, otherwise the experience will be lost. Of course it should be confidential.

The use of monographs could more quickly and better fulfill this function, would be handier, more widely available and deal with special phases. The general staff history could then be better prepared. This specialization is desirable from another point of view. It will be seen that the monograph method corresponds roughly to the type of military history concerned with the investigation of tactical tendencies, or at least lend itself readily to such a use; while the general staff history meets the requirements of a source for the deduction of general or strategic doctrine. We have observed also that in the former type the services of trained scholars is desirable and in the latter almost indespensible, and that there is a tendency to employ them there.

For some reason an attempt was made in 1919 by the navy department to secure the employment of trained scholars in the history section. Congress, however, attached a provision to the bill that no one should receive a salary exceeding $1,800.00, which effectively disposed of that. There are numerous historians in this country who are—or who could easily be—interested in

naval history. But there is none who can afford, after having spent at least ten years in an expensive preparation, to accept a position at one-half the sum that an ordinary laborer regards as a minimum living wage.

In addition to historians, even more important perhaps, there is the necessity for trained archivists to classify, to catalogue and to care for the documents.

In this connection a writer in the *Historical American Review*[18] states:

> The chief monument of the history of a nation is its archives, the preservation of which is recognized in all civilized countries as a natural and proper function of government. . . .
>
> No government has expended larger sums of money for the purchase of historical papers . . . or made more lavish appropriations for the publication of documents (too often selected at random and ill edited) than the United States; and no government has more signally failed in the fundamental and far more imperative duty of preserving and rendering accessible to the student the first and foremost of all the sources of a nation's history, the national archives.

The answer is, of course, the trained archivist. Such an official could save incalculable wasted time and wasted effort on the part of officers. Says Captain Dewar:

> The archival work was regarded as a subsidiary issue, whereas it was the converse that is true; it is the archival work that is of real importance; once that is done you can write as many histories in as many forms as you like.

Furthermore, the lack of knowledge of the existence or of the scope of sources deters many from undertaking historical work, and "There is no substitute for documents: no documents, no history."[19]

Mr. Leland quotes in his article on archives:

> The care which a nation devotes to the preservation of the monuments of its past may serve as a true measure of the degree of civilization to which it has attained.

The inference is that the degree of care which a staff devotes

[18] Waldo Gifford Leland, "The National Archives," *American Historical Review*, Vol. 18, No. 1, October, 1912.

[19] Langlois and Seignobos, *Introduction to the Study of History*.

to its archives is an indication of its military efficiency. To sum up, it would seem:

1. No archivists, no documents.
2. "No documents, no history."
3. No history, no military scholarship—only scholasticism.

Moreover, if such skilled assistance could be authorized it would be a simple matter to publish a catalogue of documents to be sent to libraries and universities, and the knowledge of these sources would attract civilian scholarship to closer co-operation with the historical section.[20] This classification and cataloguing would enable our historical section to exchange non-confidential records with other historical sections and thus enable us to broaden our scope and to make valuable comparative studies.

Finally, as the preliminary step, to enlist the interest of individuals and to secure the co-operation of civilian scholarship, it is suggested that the navy department send an officially accredited delegate to the next meeting of the American Historical Association to confer regarding possible means of co-operation between our historians and the naval history section.

While it may be an impertinence, or at least an indiscretion to make any further suggestion, this much at least may be said, that the navy possesses able and distinguished officers of real scholarly ability such as to reflect prestige about them. They themselves may not think so. The writer has observed that our naval officers as a rule stand in great awe of scholarship and are frequently possessed of a modesty with regard to their own attainments. That is as engaging as it is unnecessary. Therefore they sometimes attain to considerable distinction along scholarly lines without themselves being aware of it. Wherefore it is possible today for the navy to delegate officers before whose distinction a gathering of historians would stand in respect.

[20] The following quotations from Mr. Leland's article are enlightening:

"Turning to the department of war . . . for years . . . no one not connected with the department has been permitted to have access to the records. . . . It has never been possible to know with exactness what the war archives comprise. . . ."

"In the navy department, where students have long received generous treatment, there is material which of late years is becoming better known."

Of course it has never been done before, but if it had, perhaps we could have produced some naval history by this time. Meanwhile the mantles of Admiral Mahan and of Theodore Roosevelt —one-time presidents of the American Historical Association— have grown dusty.

[COPYRIGHTED]

U. S. NAVAL INSTITUTE, ANNAPOLIS, Md.

THE NAVY AND BUSINESS

AN ADDRESS BY ADMIRAL ROBERT E. COONTZ, CHIEF OF NAVAL OPERATIONS, TO THE NATIONAL ASSOCIATION OF MANUFACTURERS AT THE WALDORF, NEW YORK CITY, MAY 9, 1922

The navy is today one of the government's biggest assets. The property value of the navy, that is, the value of the ships, shore stations, and supplies amounts to over $3,000,000,000. This great asset belongs to the American people. The question of how to administer this organization is an important one. In conducting the affairs of any big business, is it a wise or a false economy to cut the operating and maintenance costs so as to cripple its efficiency? It seems hardly necessary to state that we must appropriate enough money to maintain and to operate the navy efficiently. In the case of the navy, as in the case of any business organization, ought we not spend enough on our investment to be able to meet our competitors, on at least equal terms? Otherwise, our organization may collapse and the money we expend be wasted.

Germany spent millions to build a navy 80 per cent as strong as the British. When war was declared in 1914, what happened? Germany was compelled to withdraw her fleet (excepting submarines) from the high seas. The great German merchant marine was forced to seek refuge in home ports or in the ports of neutral powers. British battleships, though anchored quietly at Scapa Flow, controlled the high seas. The British, having control of the seas, were thus able to rush to the western front troops from their distant possessions, from Australia, from New Zealand, from India, from South Africa, from Egypt, from Canada, and from the British Isles in the Carribean.

The greatest of naval writers, our own Mahan, has shown us in his books on the *Influence of Sea Power* that the nation controlling the seas has invariably won the war.

Clearly it seems a waste of money to have other than a 100 per cent fleet; a fleet able to meet any fleet in the world on at least equal terms.

The present Secretary of the Navy, Edwin Denby, has said:

> Whatever armed forces have cost us, they have made and kept us a nation. When we can live without fire, police, and health protection, it will be time to discuss giving up the navy.

WHY A NAVY

We should have a navy of sufficient strength to support our policies and our commerce, and to guard our continental and overseas possessions. Our foreign policies are as strong as our fleet and no stronger. President Grover Cleveland in a message in 1885, said this:

> All must admit the importance of an effective navy to a nation like ours. A nation that cannot resist aggression is constantly exposed to it. Its foreign policy is of necessity weak, and its negotiations are conducted with disadvantage because it is not in condition to enforce the terms dictated by its sense of right and justice.

China is a nation of 400,000,000 people, but China is a shining example of an impotent nation, unable through the pitiful lack of an efficient navy to defend herself against foreign aggression.

Does not this helplessness of China have a distinct bearing on the reasons for calling the recent international conference in Washington? Never before has it been so apparent that the helplessness of a nation of great resources might be the cause of another world war. To all intents and purposes, China has naval disarmament. To those in America who advocate naval disarmament, let us point to the China of today.

WHY WE BUILT OUR FIRST MEN-OF-WAR

When we were merely a British colony we had established a considerable export trade. Our people have always been inclined at the end of each war to "wreck the navy." At the conclusion of the war of the Revolution we "wrecked the navy" and disposed of every single ship. We even gave one ship to France, and in a

few years she was using it against us. We have at least partially profited by this experience, for now we scrap our ships instead of presenting them to possible future opponents. Shortly after we became an independent country and had wrecked our navy, the pirates of the Barbary Coast seized the wheat we had been shipping into the Mediterranean markets. Congress, to protect our trade, was, therefore, forced to make an appropriation to build fighting ships. So when the farmer in the great West asks why he shoud be taxed to build battleships, you can tell him that we built our first man-of-war in 1794 in order that his wheat could be safely delivered to foreign markets.

NAVY OPENS DOORS TO TRADE

The fact that Commodore Perry in 1854 opened the ports of Japan to the commerce of the world is so well-known that a review of this event is not necessary. However, the navy has done important work in the interests of our foreign commerce by opening other ports to trade. As soon as our men-of-war had defeated the pirates of Algiers, Morocco, Tripoli, and Tunis, the fleet proceeded to Turkish waters. As early as 1811, our exports to Turkey were valued at over $1,000,000 a year. Smyrna was the only open Turkish port at this time, and our trade was very much hampered by the fact that all cargoes had to be landed at Smyrna. The navy commander of our squadron negotiated with the Turks for some years, but finally succeeded in opening the ports of Turkey to our trade, and an ex-naval officer was made our first diplomatic representative in Constantinople. The navy also opened the ports of China to American commerce in 1842. It was at the end of the opium war when the British made the "Treaty of Nanking" with China, whereby the five Chinese ports of Canton, Amoy, Fuchau, Ningpo, and Shanghai were thrown open to British merchants. The American naval commander, however, was on the alert, and at once obtained copies of this treaty, which he sent to Washington. Without waiting for action in Washington, he negotiated with the Chinese viceroy at Canton and secured the same privileges for American merchants that were accorded to the British.

Diplomatic work of the highest order was performed by our naval officers in opening to American commerce ports of Turkey, China, and Japan.

NAVY PROTECTS TRADE

The navy department has divided the whole world into areas and has assigned an admiral with a squadron of ships to protect American lives, property, and commerce in each area. Should local revolutions in any part of the world threaten American lives or interests, our naval commanders are authorized to hasten ships to that locality. If our commander considers it necessary he lands men to protect our interests. Only recently the press contained notices of a probable battle between Chinese armies in the vicinity of Peking. In another column appeared the notice that the American cruiser *Albany* had anchored off Chinwantao, and had sent armed men to Peking to protect our interests. As our admiral commanding the Asiatic station considered the situation serious, he at once proceeded from the Philippines on the cruiser *Huron* to increase our forces near Peking. Two other cruisers have since been ordered. Foreign powers are bound by agreement to keep open the line of communications from Peking to the sea. Our navy is represented there now and ready to do its share.

During the Boxer troubles years ago, the allied naval forces were unable to communicate with the besieged legations in Peking. That we could not communicate with our legation during the Boxer trouble caused our government great uneasiness. Such, however, will not be the case this time, for the American navy had the foresight to install a powerful radio set in our legation at Peking. This radio set, the most powerful one in the Chinese capital, and the only one owned by Western or European powers, has an operating radius of 3,000 miles. Our admiral can keep in constant radio communication with our legation.

The navy maintains a patrol force of gunboats on the Yangtze River, and this Yangtze patrol guards our interest for some 1,700 miles up the river, right into the heart of China. It costs the navy some $3,000,000 a year to guard our interests in the Asiatic. In this connection, it might be of interest to note that our exports to China in 1920 were valued at over $145,000,000.

The navy maintains a force of destroyers in Europe for the purpose of guarding our interest in the eastern Mediterranean and in the Black Sea. We have no ambassador to Turkey. One

of our admirals is at present the American High Commissioner in Constantinople, and performs many difficult diplomatic tasks for the state department, in addition to the usual naval duties of guarding American interests with our naval forces. The Greeks and the Turks are at war and our interests are therefore in need of protection. We have large tobacco interests in the port of Samsun, on the Black Sea. In fact, 80 per cent of the Turkish tobacco exported from Samsun is shipped to the United States. The value of this tobacco amounts to $15,000,000 annually.

As an example of conditions that often exist, during a recent war a certain foreign fleet bombarded frequently its opponent's ports; United States interests were great in one of these ports and there was a considerable American population. On the approach of the bombarding fleet the ranking American officer in command of our vessels would ask the commander to give the customary twenty-four-hours' notice before bombardment as required by international law in order that non-combatants might seek places of safety; in addition our naval officer would point out the fact that there were many American subjects and much valuable American property that would be destroyed in case of bombardment. Each time this matter came up the bombarding fleet refrained from firing on the city.

Americans have large oil interests in Roumania, and these are protected by our naval forces. Due to the unsettled condition in the Near East, it is almost impossible to do business by cable through, or to get transportation for our business men from port to port. Our destroyers have been sending these commercial messages by radio and have been giving passage to our business men from place to place. The result has been that American commercial interests have been increasing rapidly in this region. It costs the navy annually some $4,000,000 to maintain our forces in European waters. This amount is mentioned merely to show how the navy money is spent in time of peace and how it benefits your commerce and therefore your prosperity.

Naval forces are maintained throughout the Caribbean Sea for the purpose of keeping down revolutions, protecting life, and protecting our commerce. Our trade could hardly exist throughout the West Indies, but for the protection given it by our Special Service Squadron. Our fruit trade throughout the West Indies

is enormous. In 1921 we imported fruit valued at nearly $50,000,000 and a great deal of this came from the countries bordering the Caribbean. The arrangements for transporting perishable fruit have been so perfected by the great American fruit companies that should a dealer in Albany want a large quantity of bananas for the market on—say the first day of June—the fruit companies know they are safe in cabling to their big fruit ranches in Costa Rica that this amount can be cut on a certain date as transportation from the ranches to the market in Albany is assured due to the protection of our Special Service Squadron. If a revolution is brewing in the vicinity of the fruit plantation in question, our naval commander at Panama has only to dispatch a gunboat and the appearance of our flag is usually sufficient to relieve the situation. The result of this whole West Indian patrol so safeguards our trade in the Caribbean that bananas from certain Central American countries can be sold on the fruit stands in New York cheaper than apples which grow in our very back yards. The sailors doing duty in this squadron have dubbed these ships the "banana boats." It costs the navy some $3,000,000 to maintain this patrol throughout the West Indies.

Although our first fighting ship was built to protect the shipment of a small amount of wheat into the Mediterranean, our wheat exports have increased so that at present wheat valued at more than three-fourths of a billion dollars is exported annually. It is only the ships of the navy that keep the doors open to foreign markets.

The men on our plantations in the South are equally interested in foreign markets, as our exports of raw cotton amount to over $600,000,000 annually. Our manufacturers are equally interested in maintaining the open door the world over, as our factories export machinery products valued at over a billion dollars a year. In fact, our total exports annually are valued at nearly eight billion dollars.

If we spend $300,000,000 a year on the navy and thereby maintain an open market throughout the world for eight billion dollars' worth of exports, is this not a good investment? Money spent on the navy serves the dual purpose of insurance in time of peace and a fighting force in time of war.

Lloyd George has recently said at Genoa that Europe may again be embroiled in a terrible war, and that America would doubtless be drawn into it. We might well exclaim: "Why is America necessarily drawn into a European conflict?" The question is readily answered. Let any of the European powers start sinking American cargoes or passengers, and we would necessarily be drawn in. If, however, our fleet is strong and highly efficient, European powers would hesitate before making ruthless war on our commerce. It seems more than probable that Germany made ruthless war on our commerce, thinking that our notorious state of unpreparedness was such that she could this with safety. Is it wise for us to be in such a state of unpreparedness that we invite attack?

NAVY A GREAT HUMANITARIAN ORGANIZATION

In time of peace the navy is extremely active working in the interests of humanity. Our officers have been detailed as governors of the Virgin Islands, of Samoa, and of Guam, while temporarily we have military governors in Haiti and in Santo Domingo. The cost of the administration of these islands is a charge against the navy. The navy is constantly spending its money to give medical treatment to the inhabitants of the Virgin Islands, Samoa, and the Philippines, Guam and its lepers.

The navy assists shipbuilding and navigation. The president of one of our biggest shipyards stated recently in a speech that the insistent demands of the navy for high qualities of steel and machinery had assisted the American shipbuilders greatly in improving the quality of their work. But for the building of our men-of-war, our shipyards would have made little progress.

Money spent by the navy in experiments have resulted in the installation of electric machinery, of internal combustion engines, and of reduction gear for propelling ships. The U. S. S. *Neptune* was the first big ship to be driven by a reduction gear; the U. S. S. *Jupiter* was the first big ship to have an electric drive; and the U. S. S. *Maumee* was the first big ship to have internal combustion engines. These pioneer installations in three large naval auxiliaries, have given highly satisfactory results.

Our development of the radio has been of great assistance to all ships; merchant as well as men-of-war. The navy radio com-

pass stations established along our coast have already resulted in saving many ships from destruction. In fact, some fifteen vessels were saved from shipwreck during the past year, thanks to these navy radio compass stations. A few remarks on the operation of the radio compass may interest those who are not familiar with this subject. Suppose a ship is approaching New York, and due to foggy, stormy weather, the captain has been unable to work out his position at sea by the usual navigational methods. The captain has merely to tell his radio operator to call the radio compass stations and ask them to give him his position. When his radio operator makes certain prescribed signals, the navy radio station at the east end of Long Island determines the direction of the ship from his station, while at the same time the radio compass station on the Jersey coast makes similar observations. These two stations then inform the captain that his ship bears—say south from the Long Island station and southeast from the New Jersey station. Upon receipt of this information, the captain merely has to draw a line running south from the Long Island station and another line running southeast from the New Jersey station. The point of intersection on the chart shows the exact location of his ship. He can then safely set his course to enter New York harbor.

The captain of the army transport *Cantigny* recently congratulated the radio compass operators at Bar Harbor and at Cape Elizabeth, as these two stations gave him such perfect radio bearings that he was able to make port in safety although due to darkness and storm, he would have been unable to work out his navigation in the usual manner. Another report has recently come in from Alpena, Mich., to the effect that the naval radio station at that place was so helpful in advising the great merchant fleet on the Lakes that the station was practically indispensable.

There are naval hydrographic offices in all our great seaports. Ship masters can obtain charts and nautical advice from these officers. Pilot charts, which the navy issues monthly, are invaluable in showing all steamship captains the safest routes to be followed across either the Atlantic or the Pacific during the various months of the year. These charts also point out the worst storm areas and the best courses to follow. The U. S. S. *Hannibal* is constantly used to make surveys through the Carib-

bean Sea in order that better navigation charts may be issued to the ships of the world. The navy with her ships scattered all over the seven seas is constantly at work endeavoring to increase the safety of navigation, and to assist ships in distress.

SEA POWER

There are many who think that our power as a great nation rests on the strength of our fighting ships. Such is not the case. "Sea power" is the basis of our real strength. By sea power, we mean a combination of all means by which we can gain and keep control of the sea. The first great element of sea power is the fighting ship, the second element is the merchant ship, and the third element is the base. A seaport well equipped with drydocks, repair facilities and food supplies, is a commercial base. Such a base, if protected in a military way, becomes also a naval base. Great Britain is truly a great sea power, for in addition to a good fighting fleet, she has a tremendous fleet of merchant ships, and has naval bases scattered throughout the world. Those bases are both commercial and naval. If, for instance, the British wish to send their fleet to operate in the western Atlantic, they have a splendid naval base at Halifax, and smaller ones at Bermuda, in the Bahamas, at Jamaica, and at Trinidad. If the British wish to have their fleet operate in the China Sea, the fleet could sail from British waters and replenish their fuel and other supplies at Gibraltar, at Malta, at Suez, at Aden, at Colombo, at Singapore, and finally operate from a well defended base in Hongkong. This great line of communication between the home land and Hongkong is well supplied with splendid naval bases. Fleets cannot operate unless they are attended by a large number of auxiliaries. It is vital for us to develop our merchant marine and to develop our bases if we wish to be a real sea power, and be one of the first powers of the world.

History shows that nations have risen to great power and have fallen with the rise and fall of their sea power. After the discovery of the western world the Dutch, Spanish, and the French all planted their flags on the Atlantic coast of North America. When, however, in 1588, the British fleet defeated the great Spanish Armada, Spain could no longer hold her possessions in North America. A century later the British defeated another

great rival, Holland, and the Dutch colonies in North America fell. As a result of the seven years' war, the British defeated France, and the control of North America passed to the Anglo-Saxon race.

The rise of England as a great sea power was really the result of Cromwell's navigation act. By this act, which was issued in 1651, all British exports and imports between England, Asia, Africa and America, and to a limited degree, from the continent of Europe, had to be carried in British merchant ships. Thus the British merchant marine was firmly founded. The merchant fleet and the fighting fleet expanded hand in hand, and the British nation became a great sea power.

Many think that if we grant a subsidy to our merchant marine, we are giving money needlessly to our shipowners. If we export products valued at some eight billion dollars annually, and ship this great quantity of material in foriegn bottoms, we are obviously paying thousands of dollars in freight charges to foreign shipowners. This money then goes to foreign shipbuilders, foreign shipyard workers, and to foreigners in all walks of life. Other great powers have found it necessary to subsidize their merchant marine in order to build up a merchant fleet. Why do we not profit by their example and subsidize our merchantmen in order that we may spend millions of dollars annually in our own shipyards and in our own factories?

WHAT THE FLEET CONSISTS OF

The fleet, to be a well-balanced fighting organization, consists of several types of weapons.

The most important is the battleship. This ship is the backbone of the fleet. The battleship must be supported by many other types of subsidiary weapons, from airships to submarines.

The destroyer is next in importance. This type is used to protect the battleship against submarines, to attack enemy battleships and plane carriers, to attack enemy submarines and destroyers and to convoy merchant ships through waters menaced by submarines.

The submarine is another important type. It is used to attack capital ships, plane carriers, armed merchantmen and transports. As a scout it is also invaluable, since it can remain close to the

enemy's ports where practically unseen, it reports by radio movements of the enemy's force. It can also lay mines off the enemy's ports.

The cruiser is also of great importance in the fleet. The battle cruiser is of first importance, for with its high speed and large guns it can drive off the enemy's scouts, defeat any type of vessel except the battleship and thus prevent the enemy's scouts from approaching the battleship fleet close enough to determine its character. Smaller cruisers are invaluable as scouts and are needed in considerable numbers. If we were conducting a campaign across the ocean, we would have to depend upon them to locate the enemy's fleet and to report its movements. Light cruisers are also used to raid enemy shipping, to protect our own, and in actual battle, to drive off enemy destroyers while protecting ours.

The plane carrier is a new weapon in naval warfare. The navy fully recognizes the great importance of aerial warfare and is particularly desirous of completing the five big plane carriers allowed us by the terms of the recent Naval Treaty. Fast plane carriers will be invaluable for use as scouts, but in addition they can send their scouting planes out in all directions to look for the enemy and to inspect enemy ports. In addition, bombing planes may be held in readiness to bomb enemy ships and ports.

Mining ships constitute new weapons in modern warfare. This type comprises mine layers and mine sweepers. Their names indicate their activities.

We must have a suitable number of all types of ships in order to have a well balanced fleet. At present we are woefully short of cruisers, although we have a considerable number of destroyers. There is a popular impression that our excess destroyers can take the place of cruisers. This is erroneous.

Before the advent of the submarine, and before the details of trans-oceanic scouting were fully appreciated, we had determined that four destroyers were necessary for each battleship. Due to the advent of the submarine, four destroyers for each capital ship are barely sufficient to provide a close submarine screen around the battleship fleet. With the absence of cruisers, it would be necessary to send out another large force of destroyers to scout for the enemy. A third force of destroyers would be needed to

convoy our transports and supply ships through submarine-infested waters. During the recent war, we finally employed some sixty destroyers to escort our transports and auxiliaries through the submarine zone. Even under the recent treaty, our armed transports and auxiliaries would be subject to submarine attack so we would still need destroyers for convoy purposes. If we had some fifty or sixty light cruisers, we could utilize them as scouts and would then not need the large number of destroyers now on the navy list. We have no first line light cruisers at present and but ten building. Another great power has forty-six first line and fifteen second line light cruisers, which gives this power a better balanced fleet. Some may ask why we have built a large number of destroyers without building light cruisers. The answer is that during the recent great war we felt the great need of destroyers for convoying troops and supply ships. The construction of a large number of destroyers resulted. Every effort is now being made to preserve the material of these destroyers, even though they are out of commission. Our long coast line along the Atlantic, Gulf, and Pacific coasts, necessitates a large fleet. To maintain in repair these ships, it is obviously necessary to have a number of navy yards on both the Atlantic and Pacific coasts. If we would be prepared to operate our ships efficiently in time of war, it seems clear that we should keep the various types of ships concentrated into fleets that they may be maneuvered as fleets in time of peace. That is why all the first-line battleships are kept in one battle fleet.

It is quite appropriate in discussing the fleet and the type of ships to discuss the number of men needed to man this fleet. As ships in themselves are only masses of steel, men are of vital importance. Men fight—not ships.

The navy does not contemplate keeping all our ships in commission in time of peace, as this would require over 120,000 men. After an exhaustive study of the question the navy department decided that in view of the economic situation in the country, it would ask for 96,000 enlisted men and apprentices. Congress will probably vote the funds to provide for a navy of 86,000 men. The navy department will, of course, use every endeavor to make this number of men effective. There will be under this apportionment

no destroyers and no submarines in reserve; they will be put out of commission.

There seems to be a general impression that the treaty navy consists of eighteen battleships with little else. As a matter of fact, the treaty navy consists of eighteen battleships, and five plane carriers, and all the cruisers, destroyers, submarines, mining ships, and auxiliaries we choose to build. While it is true that with 67,000 men we could man eighteen battleships, with this number of men we could not efficiently man the other types of ships necessary to make up a balanced fleet. It would be out of the question to attempt to return to our pre-war basis since prior to the great war we had no aviation service, no mining service, or no submarine service worthy of mention. We should now make every effort to develop naval aviation, submarines, and our mining forces. On account of the necessity of maintaining all of these types of ships, we require the men the navy department has asked for. There have been heard many arguments pro and con as to how many men the navy needs. It has been said that because one naval officer wants 1,200 men for a battleship and another 1,300, that the navy does not know what it wants. These differences are very small. In fact, they are smaller than the differences you would get from any two men in any walk of life on a given subject. The navy is, however, unanimous in its agreement that we must have all types of ships in commission in time of peace, and the navy is in accord that we should not go below the number of men for safety and emergency.

It takes years to train a naval officer so that he can with certainty go out and handle a big ship or maneuver a fleet. The navy believes that we should not throttle the output of the Naval Academy and reduce its natural value as a great educational institution.

There is an erroneous idea that it is most unusual to give a boy in this country a free education by sending him to the Naval Academy. How curious! Have we not some 22,000,000 pupils in our public schools and do not the people of the United States spend over a billion dollars a year to give them a free education? The national government spends little on education, leaving to our cities, states and counties the duty of educating our children.

The Naval Academy is the only great nautical college in this country. If we are to have a great merchant marine and great shipyards, we shall have great need for men of nautical training. Many graduates from the Naval Academy have risen to high positions in civil life: such as Homer Ferguson, president of the Newport News Shipbuilding Company and president of the Chamber of Commerce of the United States; J. W. Powell, one-time president of the Fore River Shipyard, then manager of five shipyards for the Bethlehem interests during the recent war, and recently president of the Emergency Shipbuilding Corporation; and Wm. Emmett, the designer of the electric drive for ships. These are but three of the Naval Acadamy graduates who have resigned and gone into civil life to help our shipbuilding industries. There are many others.

Under existing law, we can have over 3,000 midshipmen at the Naval Academy. About sixty per cent of those entering are graduated. Thousands of boys are unable to get seats in the overcrowded schools of the country.

FALSE PROPAGANDA AGAINST THE NAVY

A few remarks concerning false propaganda circulated to impair the strength and efficiency of the navy will not be amiss.

(a) *Excessive Cost.* It is quite a popular fallacy to think that a holiday in battleship building will bring a great reduction of taxes. The people do not appreciate that the cost of government involves four great budgets and not merely the budget passed by Congress. They are: The national budget, the state budgets, the county budgets, and the city budgets. The cost of government may be high in the United States, but the federal budget comprises hardly one-third of the total cost of government. Here in New York City, the people must raise some $400,000,000 to meet the state, county and city budgets. This means that the per capita cost of state, county and city government in New York City is about $72.00. The cost for the whole navy, if Congress appropriates $300,000,000 for it, will be less than $3.00 per capita. If, therefore, the whole naval appropriation were eliminated, the per capita cost of government in New York City would be little reduced. We can hardly say that it is a terrible extravagance to spend $300,000,000 a year on the navy, when we spend over $1,141,000,-

000 annually on tobacco alone. During the past year we spent three times the cost of the entire navy on admissions to theatrical and other amusements. We spent twice the cost of the navy on candy and chewing gum. This is an extravagant country, but it is not an extravagance to spend $300,000,000 on the navy when we realize what the navy means to us and to our prosperity. If you want a substantial relief from the burden of taxation, would it not be wise for you to appeal to your state, county and city governments for a holiday?

(b) *Disarmament to Prevent War.* A slight study of history is sufficient to show that disarmament will not prevent war. At the end of our Revolution, we put total naval disarmament into effect, and almost immediately had to start building men-of-war in order to get our products to a foreign market. What would happen, as a matter of fact, if all powers in the world sunk every fighting ship in existence? Upon the declaration of war, our merchant ships would become our men-of-war. It would merely be necessary to put guns on our merchant ships and the big ocean liners would be converted into battleships and the fast yachts into cruisers and destroyers. In 1812, when we had practically no fleet at all, we mounted guns on 500 of our merchant ships and they became fighting ships and destroyed some 1,350 British merchant ships. The recent Naval Treaty permits all countries to put gun foundations, capable of taking six-inch guns, on merchant ships in time of peace. With all fighting ships abolished and guns put on merchant ships, England, with her 10,000 merchantmen, would at once control the seven seas, for she has more merchant ships than all the other great powers put together and more naval bases from which to operate them than all other powers combined. It seems futile, to even suppose that fighting would stop if we sunk our fighting ships. We do not have to turn back the pages of history very far to find that great battles were fought before the advent of modern fighting ships. In fact, if you turn to *Creasy's Fifteen Decisive Battles of the World,* you will find that over 2,000 years ago, one of the decisive battles of the world was fought between fleets of galleys and before gunpowder was known. It was in 415 B. C. that the Athenian fleet was defeated off Sicily and Athens lost control of the eastern Mediterranean and her sea power was ended forever. Crews of these galleys were armed with

sling shots and catapults. If we diminish our naval power, we lessen our influence in the world to preserve peace. Many writers have pointed out that had we not been a great world power, we could not have called the recent world conference, in Washington. If China had called a world conference to consider a reduction of armament, the world would have looked upon it as a huge joke. If now we reduce our navy to a state of impotency, we will reduce our power to do good and our power to keep the peace of the world.

(c) *Navy not a Destructive Force.* Many of the pacifists actually seem to think that military forces are only bent on destruction. As a matter of fact they are really constructive. Wherever they go, they better local conditions, establish schools, and improve public health. What was Panama at one time before we went there? It was a fever-infested place where human beings died like flies. America sent a military force there, which soon converted Panama into a regular health resort, and a great canal, one of the engineering wonders of the world, was soon completed and put into operation. It can be truly said that our armed forces have saved more lives than they have taken. After the Spanish war, by the introduction of good sanitation, we saved more lives in Cuba and Porto Rico than we took during the war. Some months ago, during the great coal strike in West Virginia, when lives were being sacrificed at an alarming rate, the regular army appeared and good order was quickly restored without the firing of a single shot. The horrors of war are very much exaggerated. Over 12,000 people are killed annually in the United States by automobiles. Yet we still think of the horrors of a bloody battle, but give little heed to the lives lost by careless operation of automobiles.

(d) *Responsibility of Leaders.* Propagandists anxious to "wreck the navy" invariably tell you that they are responsible for the statements they make. How can men who do not occupy responsible positions be responsible for what they say? The soap-box orator on the street corner may say he is responsible for what he says when he advises the public to destroy our military forces. However, the soap-box orator, as well as most peace society leaders, is not responsible and his statements should carry little weight. Our President, the man the voters have put in the White House

to administer our affairs, is a responsible spokesman. From Washington to Harding, these spokesmen have advocated a strong navy. Let me quote from a few of their messages:

Washington said in 1790 that "To be prepared for war is one of the most effectual means of preserving peace." Again he said, "To secure respect to a neutral flag requires a naval force organized and ready to vindicate it from insult or aggression."

Adams said, "We ought, without loss of time, to lay the foundation for an increase of our navy to a size sufficient to guard our coast and protect our trade. Such a naval force will afford the best means of general defense."

Jackson said, "Constituting as the navy does, the best standing security of this country against foreign aggression, it claims the especial attention of government, and should continue to be cherished as the offspring of our national experience."

Lincoln said regarding the civil war, "The events of the war give an increased interest and importance to the navy which will probably extend beyond the war itself. I commend to your consideration the policy of fostering and training seamen for the naval service."

Grant said, "With an energetic, progressive, business-like people like ours, penetrating and forming business relations with every part of the known world, a navy strong enough to command the respect of our flag abroad is necessary for the full protection of our rights."

And Roosevelt said, "But there is something we need even more than additional ships, and this is additional officers and men. To provide battleships and cruisers and then lay them up with the expectation of leaving them unmanned until they are needed in actual war, would be worse than folly. It would be a crime against the nation."

Our position as a world power varies with the strength of our fleet. Our power to protect our citizens and our commercial interests abroad varies with the strength of our fleet. Our power to call a world conference to preserve the peace of the world varies with the strength of our fleet. Our presidents, who are our real responsible leaders, have always advocated an efficient fleet.

The naval officer is not interested in any one section of our country or in any one industry, but he is interested in the develop-

ment of our country as a whole, in fostering and protecting our citizens and our commercial interests abroad. He does not want war, but does ask for a 100 per cent fleet that he may uphold our national dignity, protect our commerce, and our citizens abroad, and be ready for battle when the crisis comes.

NAVY DOES NOT CAUSE WAR

"Small navy" advocates like to say that a big navy fosters war. Face the facts and ask yourselves, how did we come to enter the recent war, the Spanish war, the civil war, the Mexican war, the war of 1812, the naval war against the French, the war against the pirates of the Barbary Coast, and the war of the American Revolution? We find without much research that the navy was in no way responsible for any of them. It was the people, bringing pressure upon Congress, who brought about the declaration of hostilities.

In time of peace, our statesmen, chosen from civil life, run our government and determine its foreign policies. To the navy falls the task of preserving peace, sometimes at home, sometimes abroad. When the government is no longer able to maintain peace, Congress declares war. The navy steps in and restores peace, returning the reins of the government to the civil officials.

The statesmen who recently gathered in Washington developed plans which they hoped would preserve the peace of the world. If these steps prove successful, we shall have peace. Let us keep up our navy so that we may again sit at the first table at the next conference.

DISCUSSION

Co-ordination in Army and Navy Training

(See Page 593, Whole No. 230.)

Captain Ridley McLean, U. S. Navy.—We are all prone to deal in generalities, and any officer who reads either the title or the contents of the very timely essay by Colonel Williams, entitled "Co-ordination in Army and Navy Training" will at once agree with the general idea therein expressed; but with this concurrence the subject will probably be dismissed from his mind. It is not my object either to criticize or to amplify Colonel Williams' excellent paper, but rather to bespeak for it more than a mere passing approval. It is not mere approval that is necessary, it is action. Before I began my course at the Army War College I was quite prepared to concur in general with Colonel Williams' arguments as to the necessity of co-ordinating the training of the two services, but I shall never forget, as my very first outstanding impression after entering upon my work at that institution, my keen appreciation of the fact that the *army* and the *navy* are merely arbitrary divisions in a larger organization—the fighting forces of the United States—upon which falls the task of defending this country in war.

In a study of this nature we obscure the issue if we devote attention to the numerous minor disturbances short of real war which may be handled by either service separately; therefore in the following remarks I consider only a war requiring a major effort. In such a war the activities of the two services merge into one as surely as do the activities of the destroyer force and the battleship force in a naval engagement, or as do the artillery, the infantry and cavalry in a land battle. In such a war the army and the navy are merely two grand divisions of a single fighting force under a common commander, the President.

It is trite to say that in waging such a war it is necessary that these forces co-operate. Every officer knows this, just as every officer, including the participants, knew that it was necessary for the Allied armies to co-operate with each other during those fateful years before the appointment of Marshal Foch actually effected this co-operation. In other words the necessity for co-operation is fully appreciated by all; but this is not enough—just as it was necessary in the Allied armies to take active steps to insure effective co-operation, so are active steps necessary if we are to have the most effective co-operation between our two services. It must not be assumed that this co-operation will come naturally without such effort.

If two officers in responsible positions, each of dissimilar training and habits of thought and not intimately familiar with the problems of the other, are brought together in conference, their co-operation, however much they may realize its importance, is more than likely to be academic and superficial. Real co-operation, that which is essential to the highest efficiency in preparation for and in conduct of war, is something deeper than this; such co-operation must not be merely mental, it must rest upon a basis of mutual appreciation and sympathetic understanding of the problems presented. It is dependent largely upon a similarity in the mental processes of the two officers, which in turn is largely the result of similarity in their prior training. Unless deliberate steps be taken to effect this end, real co-operation will not characterize our operations of war. Colonel Williams recommends co-ordination of training as the one practicable means of attaining the desired end.

By reason of its geographical configuration, a war-plan for our own country, more perhaps than is the case in any other country, must be based upon the capabilities of both the army and the navy. It must be a combined affair. The plans of either service made separately, or even in incomplete harmony with the other, are futile, and when the emergency arises if such plans are not impossible of execution they will at least fail to produce maximum results. The existence of the joint board is a recognition of this fact, but the co-operation between the members thereof will only be complete when harmony of thought shall have been created by a similarity of professional education.

A hurried reading either of the above remarks or of Colonel Williams' paper may leave the impression that it is only in planning and conducting operations of war that co-operation is necessary. It is for that reason that I desire to emphasize a feature which has been most strongly brought home to me during my eighteen months' service at the Army War College, namely, that however important co-operation may be in active operations, co-operation between the two services in the broad question of procurement of personnel and supplies and in fact in all features involved in preparation for war, is even more important, if possible, than in war itself.

Space forbids an extended discussion of this feature; it is sufficient to point out that for personnel, raw material, fabricated products, transportation, and manufacturing facilities the army and the navy both draw from the same reservoir; and too this reservoir must at the same time supply the civil population with commodities necessary to the life and morale of the nation. Consequent upon this, super-agencies forming in effect a staff of the President as commander-in-chief, controlled supply in all of its phases during the latter part of the Great War and unquestionably must do so again in another major effort. In their dealings with these super-agencies, the army and the navy come, as bidders for the same commodities, the same personnel and the same facilities, more closely in contact even than in the operations themselves. It is here that that mutual understanding of the mission and problems of the other, and a sympathetic realization that

each service is working as a unit of the same organization for a common end is especially necessary.

It may be stated: "Yes, this is true; but how can this co-operation be obtained practically?" The answer, as suggested by Colonel Williams, is: "By education and combined operations in peace." By such means not only will each service be familiarized with the problems of the other, but by the contacts thus rendered possible between officers, personal friendships, and feelings of mutual professional esteem are formed, the importance of which can scarcely be overestimated in the promotion of co-operation in subsequent campaigns in which these same officers will participate in important rôles.

To those who would suggest that it is impracticable to thus educate all officers of each service in the advanced schools of the other, it should be pointed out that this is by no means necessary. The essential official contact between the army and the navy necessarily occurs chiefly between the higher commands,—in the plan-making divisions, the joint board, the bureaus in the departments and in the corresponding agencies respectively afloat and in the field. A liberal policy as to the utilization of the educational facilities of the sister service on the part of each, would in a few years produce a sufficient sprinkling of officers in each service who were graduates of the War College of the other, largely to effect the ends desired: a few actual maneuvers involving embarkation, convoy and landing operations on a major scale would go far towards avoiding a future Gallipoli in the history of our country.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership

Life, regular and associate, 4,812. New members, 5. Resignations, 9. Deaths, 3:

Commander J. D. J. Kelley, U. S. Navy (Ret.). Commander J. M. Poyer, U. S. Navy (Ret.). Lieut. Commander F. W. Milner, U. S. Navy (Ret.).

Practically the whole service receives the benefit of the PROCEEDINGS, yet many officers who read it monthly are not members, and therefore contribute nothing to the support of the Institute.

Members are requested to urge non-members to join. Publication costs are now so high that the Institute is carrying a loss. The cost, per members, however, decreases with an increase in membership.

Special Notice

Checks payable by banks in Cristobal, Panama, Pearl Harbor, Honolulu, Haiti, Santo Domingo and Colon, are liable to a collection charge of twenty-five cents. This being the case, it is requested that makers of checks take this matter into consideration when sending remittances payable to the Naval Institute by adding twenty-five cents to the actual amount of checks, otherwise the Institute has to pay these charges. Checks remitted without the additional amount for charges will be debited against the maker for collection.

Dues

The annual dues ($3.00) for the year 1922 are now payable.

Regular and associate members of the U. S. Naval Institute are subject to the payment of the annual dues until the date of the receipt of their resignation.

Discussions

Discussion of articles published in the PROCEEDINGS is cordially invited. Discussions accepted for publication are paid at one-half the rate for orginal articles, or about $2.25 a page.

Address of Members

To insure the delivery of the PROCEEDINGS and other communications from the U. S. Naval Institute, it is essential that members and subscribers notify the secretary and treasurer of every change of address, without delay.

Book Department

The Institute Book Department will supply any obtainable book, of any kind, at retail price, postage prepaid. The trouble saved the purchaser through having one source of supply for all books should be considered. The cost will not be greater and sometimes less than when obtained from dealers.

The Boat Book, 1920, and *The Landing Force and Small Arms Instructions,* 1920, are now ready for issue. The price of the former is $.50 and the latter $1.00 per copy.

The Principles Underlying Radio Communication (Second edition). Radio Communication pamphlet No. 40—Prepared by the Bureau of Standards; revised to May 24, 1921, by Signal Corps, U. S. Army. Price: $1.00, plus postage (postage governed by zone. Weight of book: 2 lbs.). Address orders to: U. S. Naval Institute, Annapolis, Md.

Articles

The Institute desires articles of interest to all branches of the service, including the reserve force. Attention is invited to the fact that the submission of articles is not limited to members, and that authors receive due compensation for articles accepted for publication.

All articles and discussions submitted by persons belonging to the navy for publication in the PROCEEDINGS must be in duplicate, one copy being signed by the author, which will be submitted to the Navy Department when the original is published, as required by General Order No. 46, of May 20, 1921.

Reprints of Articles

The attention of authors of articles is called to the fact that the cost to them of reprints other than the usual number furnished can be greatly reduced if the reprints are struck off while the article is in press. They are requested to notify the secretary

and treasurer of the number of reprints desired when the article is submitted. Twenty copies of reprints are furnished authors free of charge.

Illustrations Authors of articles submitted are urged to furnish with their manuscript any illustrations they may have in their possession for such articles. The Institute will gladly co-operate in obtaining such illustrations as may be suggested by authors.

Original photographs of objects and events which may be of interest to our readers are also desired, and members who have opportunities to obtain such photographs are requested to secure them for the Institute.

Notice Whole Nos. 6, 7, 10, 13, 14, 15, and 17 of the PROCEEDINGS are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 75 cents per copy.

ANNAPOLIS, MD., May, 1922

INFORMATION INDEX

	PAGE
ADVERTISEMENTS, INDEX TO	I
PUBLICATIONS, U. S. NAVAL INSTITUTE	(2)
SPECIAL NOTICE	1076
TOPICS FOR ESSAYS	1097

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT R. A. HALL, U. S. Navy

GENERAL ARRANGEMENT

VESSELS BUILDING	France	1013
NAVAL POLICY	Germany	1014
MATÉRIEL	Great Britain	1017
PERSONNEL	Japan	1023
MERCHANT MARINE	United States	1027
AERONAUTICS		1035
ENGINEERING		1043
NAVIGATION AND RADIO		1051
ORDNANCE		1053
MISCELLANEOUS		1057
CURRENT NAVAL AND PROFESSIONAL PAPERS		1059

FRANCE

NAVAL CONSTRUCTION.—After undergoing several modifications since its introduction two years ago, the programme of naval construction, providing for an expenditure of 755 million francs to be spread over a period of four years, has been adopted by the Senate. The five battleships of the *Normandie* class, which were started upon before the war and are now hopelessly out-of-date, are, of course, to be scrapped. The *Béarn*, which was near completion at the armistice, is alone to be utilized as a seaplane carrier. The new constructions comprise three light cruisers of 8,000 tons, which are to carry eight guns of 150 mm., four of 75 mm., and eighteen torpedo tubes, and to be capable of steaming at 34 knots; six destroyers of 2,500 tons with a speed of 35 knots; twelve torpedo boats of 1,400 tons with a speed of 32½ knots; and twelve submarines with an immersed displacement of 1,100 tons and having a radius of action of 7,000 miles. The programme came in for some stringent criticism on the ground that it was a continuance of the policy adopted for so many years past of equipping the navy with a variety of "samples" that prevented the constitution of a homogeneous fleet. It was admittedly a provisional programme, adapted to the present financial conditions, and was intended to "carry over" until such time as a more ambitious scheme of construction could be introduced, for the general tendency of the debate was in favor of France possessing an adequate defensive navy which could not be sacrificed even if the security of the country were guaranteed by other naval powers. The idea of constructing capital ships up to the tonnage allowed by the Washington Conference seems, for the moment, to have been abandoned. No one suggested their necessity or even their utility, and it is noticeable that French naval strategy is centered entirely in the light and fast cruisers, destroyers, submarines, and air craft.

The minister of marine affirmed that the future programme would provide for a complete organization of aeroplanes in association with a large number of submarines, and it was evident from the debate that no concession is likely to be made to other Powers in the number of submarines that may be constructed, for vessels of that type are regarded as indispensable for the security of the country and for maintaining a seaway between France and North Africa.—*The Engineer*, 24 March, 1922.

FRENCH TAKE OVER RUSSIAN STEAMER.—The steamship *Chicago* of the French line arrived from Havre on Saturday last bringing Captain August Vioulles and twenty-one officers and men to take over the Russian steamer *Penza*, formerly of the Russian volunteer fleet, which has been lying for months in the Erie Basin, Brooklyn. Her name will be changed to *La Maras*. She is a vessel of 2,679 gross tons and was built at the Schichau Yard, Danzig, in 1909.

It is stated that the Soviet government is very much exercised at the way in which vessels of the Czar's government have been acquired by foreign powers and that it intends to demand the return of these ships at the coming Genoa conference.—*Nautical Gazette*, 8 April, 1922.

GERMANY

GERMAN NAVAL NOTES.—Further particulars are to hand of the post-war German naval organization. The establishment of armoured ships and light cruisers, as specified by the peace treaty, is equally divided between the Baltic and North Sea stations, but for some reason—probably not unconnected with the financial situation—only a few ships are in full commission so far. The active squadron in the Baltic comprises the battleship *Hannover*, the light cruiser *Medusa*, the tender *Nordsee* and a torpedo flotilla of 12 boats with the *T-44* as leader. There are also in commission a half-flotilla of minesweepers, the gunnery tenders *Drache*, *Delphin*, and *Hay*, the surveying ship *Panther* (ex-gunboat), and a few miscellaneous auxiliaries. In reserve on the Baltic station are the battleships *Hessen* and *Schleswig-Holstein*, and the light cruisers *Berlin* and *Thetis*. The active North Sea squadron, based upon Wilhelmshaven, consists of the battleship *Braunschweig*, light cruisers *Hamburg* and *Arcona*, and a minesweeping flotilla which includes the large fleet sweepers *M-134*, *M-138*, and *M-81* (511 tons, 16 knots), besides a few auxiliary craft. In reserve are the battleships *Elsass* and *Schlesien* and the light cruiser *Amazone*.

Most of the vessels mentioned above have undergone a certain amount of reconstruction since the war. *Schlesien* and *Schleswig-Holstein* have each been given a secondary armament of fourteen 5.9 in. in place of the original fourteen 6.7-in. guns; the five submerged torpedo-tubes on the broadside and at the stern have been removed and four 19.7-in. deck tubes fitted instead, this latter change having been made also in all the remaining pre-dreadnought battleships. The light cruisers *Berlin*, *Hamburg*, *Arkona*, *Medusa*, *Amazone*, *Thetis*, *Nymphe*, and *Niobe* have been rearmed with ten 44.1-in., 45-cal. guns and two 19.7-in. deck tubes, in place of the 40-cal. guns and 17.7-in. tubes originally mounted; and the 16 largest destroyers, *T-175* to *S-23*, now carry two 4.1-in., 45-cal. Q.F. apiece.

The first authentic details of new ships that were in hand at the armistice have lately been published in Germany. They included the battleships *Sachsen* and *Württemberg*, launched in 1916 and 1917 respectively, which were identical in every way with the *Baden* and *Bayern*, and the battle cruisers *Graf Spee (Ersatz-Blücher)* and *Mackensen (Ers. Viktoria Luise)*. These two last-named ships are of unusual interest, for they were designed in 1913-14 and thus represented the German reply to our *Lion* class and the *Tiger*. Their displacement was 31,000 tons, the designed speed 28 knots,

and the armament was to have been eight 14-in. guns, twelve 5.9-in., and eight 3.4-in. Q.F., and five torpedo-tubes. The complement was 1,429. They were thus considerably larger and more powerfully armed than their British contemporaries, and showed a distinct advance over the *Derfflinger-Lützow* class, of 26,000 tons, 26½ knots, and eight 12-in. guns. The 14-in. (35.56-c.m.) gun was 50 cals. in length, firing a 1,364 lb. projectile with an initial velocity of 2,870 ft.-secs., and penetrating 44.8 in. of steel near the muzzle. In spite of its larger calibre, this gun weighed rather less than the British 13.5-in., 45-cal., so that in the two German ships, with their increased tonnage and less powerful machinery, a large margin must have been available for protection. It is clear that Germany still preferred to differentiate between battleship and battle cruiser in armament as well as in speed, for the battleships coeval with *Graf Spee* and *Mackensen* were armed with 15-in. guns.

Besides those scuttled at Scapa Flow, there were five light cruisers, completing at the date of the armistice, viz., *Wiesbaden, Rostock, Magdeburg, Frauenlob,* and *Leipzig,* all of which had been launched in 1917 or 1918. Together with the *Dresden* and *Köln,* both lost at Scapa, these five vessels belonged to a type which had evidently been standardized as the most appropriate for German requirements. It differed from the majority of our cruisers built under the war programme in having greater displacement, higher freeboard, and heavier armament, but less speed, and was probably superior for general purposes, though perhaps unnecessarily large and expensive for service in the North Sea and the Baltic.—*Naval and Military Record,* 5 April, 1922.

GERMAN AVIATION.—The following is a translation of an article by Lieut. Colonel Reboul of the French army, which appeared in a recent issue of the French publication *Le Temps:*

The ministry of war of Germany has just published regulations which enlighten us on the state of mind of the German high command and its designs. The "Instruction on the employment of aviation to be used for maneuvers, regimental exercises and drills in tactics" is a statement in concise form of the opinions of the German high command on the employment of aviation during the war.

Article 198 of the Treaty of Versailles prohibits Germany from keeping any aeronautical force whatever. This, however, does not prevent the minister of war from declaring in this instruction: "In the distribution and employment of the aviation formations we have taken as a basis a modernly equipped army for use in giving decisive combats." It does not prevent the cadres of the *Reichswehr* from already undergoing training in the use of the aeroplane. In their *Kriegspiele* they assign missions to it and receive information from it. They are accustoming themselves to handle it, to consider it as an arm, the collaboration of which is indispensable. They are making preparations to use aeronautics in connection with the other arms.

Doubtless the *Reichswehr* will be unable to begin the actual exercises so long as our control commissions remain in Germany. But the day they leave, the "Instruction on aviation" will immediately be put into effect. The plan being already known to all, it would require but a short time to put it into operation and have an aviation force working in close union with its command, its infantry, its artillery and its cavalry.

Chapter II of the regulations treats of the aerial formations. It provides for an exceedingly high aviation equipment for each large unit.

The infantry division includes organically a strong squadron of two escadrilles. One of these, the reconnaissance escadrille, will be used for close missions and for observation of the battlefield. The other will work

with the divisional artillery. Each of these escadrilles comprises twelve aeroplanes. The German army thus realizes the desiderata which we expressed at the end of the campaign of 1918. The division is henceforth permanently equipped with its eyes and observers. Its aviation will work constantly with the same units. They know one another wonderfully well; they have confidence in one another; they conform to one another's customs and idiosyncrasies. The results will be incomparably greater than those obtained with escadrilles that are assigned only temporarily to the divisions. At the moment that everyone begins to speak the same language the escadrille is replaced by a new one. Everything must be begun all over again.

The army corps has its own squadron which has the same composition as the divisional squadron. Its reconnaissance escadrille will specialize in photography and in night reconnaissance; its artillery escadrille will regulate the heavy artillery firing of the army corps.

The army is very strongly equipped with aviation units. The regulations provide for the assignment to it of one observation squadron, combat squadrons, pursuit squadrons and bombarding squadrons.

The observation squadron is of the same type as the divisional squadron; but its aeroplanes will as a rule be superior. They will, in fact, penetrate more deeply into the enemy lines. The reconnaissance escadrille will make distant reconnaissances and photographs of the enemy's rear areas. The artillery escadrille will regulate the fire of the high powered heavy artillery which will be directed against the enemy quarters, its parks, railways, installations and points through which it is compelled to pass.

Each army in active operations has assigned to it a combat unit with a strength of three or four squadrons. Each squadron comprises four escadrilles of twelve aeroplanes each. This represents a body of 150 to 200 aeroplanes which will have as its mission to take part in all the phases of the battle, both in aerial combats and in combat against the other arms. In an attack it will act with the assaulting troops, will precede the first waves, mowing down the enemy reserves and bombarding the centers of resistance.

The pursuit unit will be especially charged with the aerial fighting. It comprises from four to six pursuit squadrons, each squadron comprising three escadrilles of twenty-one planes. Its mission is to hinder the enemy reconnaissance and prevent the enemy combat aviation from taking part in the battle. It must enable its own reconnaissance aeroplanes to accomplish their mission. Its object is aerial combat. Pursuit planes should act in mass so as to be master of the air, at least during certain hours. They may be reinforced for certain missions by combat and bombarding squadrons.

The bombing aviation is less strong numerically than the combat and pursuit aviations. It consists of from one to three squadrons, each formed of three escadrilles of twelve planes. It is to be used in bombarding by day as well as by night.

The group of armies has only a very limited aviation force, which consists of one escadrille of twelve planes for making reconnaissance which are of special importance to it and which it wishes to entrust to observers whom it knows and can rely upon, and one artillery escadrille of twelve planes for the long-range and very mobile guns, especially those on railways, which it fires now in one direction, now in another.

The general headquarters reserves a few combat and pursuit squadrons both for its own safety as well as for an aerial reserve. It will itself conduct the fighting against vital points in the enemy's back areas by means of bombing squadrons and giant aeroplanes which it will bring into action.—*Aerial Age Weekly*, 3 April, 1922.

GERMANY NEED ONLY BUILD 126,000 TONS FOR ALLIES.—One by one the reparation clauses of the Versailles Treaty are being either disregarded or whittled down. The latest one to be almost entirely waived is the one in regard to the construction by Germany of 1,000,000 tons of shipping for the Allies.

In accordance with the terms of the treaty, Germany was obligated to lay down 200,000 tons gross of new merchant shipping each year for a period of five years beginning with April 10, 1920. As explained in the British House of Commons, by Sir Robert Horne, chancellor of the exchequer, however, no such tonnage has as yet been laid down, and in view of the fact that Great Britain and Japan have waived their claims, the maximum that can be required from Germany after April 10, 1922, is only 42,000 gross tons a year for three years. France and Italy intend to have a few vessels laid down in Germany on their own account.—*Nautical Gazette,* 22 April, 1922.

GREAT BRITAIN

NAVAL VESSELS UNDER CONSTRUCTION.—According to information given in the course of Parliamentary business, there are thirty-two vessels at present under construction for the navy, representing a total cost, including guns, of about £20,500,000. The vessels are all cruisers or smaller craft, the exact details being seven light cruisers, six destroyers, eight submarines, six coastal motor boats, one mine layer, two flotilla leaders, and two aircraft carriers. Many of the vessels have been under construction since 1917. It was added on the same occasion that since the armistice no subsidies had been paid to any armament firm.—*The Engineer,* 7 April, 1922.

INFLEXIBLE TO BE BROKEN UP IN GERMANY.—The battle cruiser *Inflexible,* which helped to sink von Spee's German squadron off the Falkland Islands, and thus avenged the loss of the *Good Hope* and *Monmouth,* left Devonport on Saturday in tow of the Dutch tugs *Zwartzee* and *Witte-zee* for Germany, where she is to be broken up.

Launched in 1907, the *Inflexible* is one of the three first battle cruisers built for the royal navy, the others being the *Invincible,* which was sunk at Jutland, and the *Indomitable.* The *Inflexible* was the vessel which had the distinction of flying an admiral of the fleet's Union Jack across the Atlantic when she visited New York as flagship of Admiral of the Fleet Sir Edward Seymour for the Hudson-Fulton celebrations in 1909.

Early in the late war the *Inflexible* took part in the Heligoland Bight action, and the next time she came into contact with the Germans was off the Falkland Islands against von Spee's squadron. She also took part in the battle of Jutland.

Last year the *Inflexible* was taken to Devonport to be converted into a training ship for boys, but the proposal was abandoned on the ground of cost.—*Naval and Military Record,* 12 April, 1922.

OIL CARRIER "NASSA."—The single-screw oil carrier *Nassa,* which has been built by the admiralty at Devonport on a fixed price contract for the Anglo-Saxon Petroleum Co., Ltd., London, is the second oiler to be built in the Devonport yard, under the repayment system inaugurated by the Colwyn committee, to provide work for the employees in the admiralty dockyards, but the launching this week is especially interesting, as she is the first vessel laid down in the yard for an outside firm. Laid down on March 8, 1921, the vessel is being built on No. 4 slip at the South Yard. She is being built on the Isherwood system of framing, so that the main frames are longitudinal instead of transverse, and she will have a dead-

weight capacity of about 8,400 tons. Her principal dimensions are: length (between perpendiculars), 417 ft.; breadth (extreme), 53 ft. 4 in.; depth (moulded), 31 ft.; gross tonnage, about 5,680; underdeck tonnage, 5,263; net tonnage, 3,435 tons; and she will have a speed of 11 knots. Her engines are of the triple expansion type with cylinders of 27-in., 45-in., and 74-in. diameter, and with a stroke of 48 in. these are estimated to produce 2,800 horsepower at from 78 to 80 revolutions per minute. Her three single-ended boilers, 15 ft. 6 in. in diameter, by 11 ft. 7½ in., are designed to burn either coal or oil fuel. She will carry about 1,140 tons of fuel.

The vessel has been designed to carry oil in bulk in nine main tanks and five other tanks, and a 10-in. double pipe line is intended to obviate mixing when different kinds of oil are being carried.—*Naval and Military Record*, 29 March, 1922.

A VANISHED FLEET.—Before the end of the present year the reserve fleet, as we have known it for many years will have ceased to exist. and for the first time in the modern history of the navy there will be no second line of ships to reinforce the battle fleet. This is one of the consequences of the Washington naval agreement, which provides for the scrapping of practically all the capital ships now in reserve. It is possible that further units will be withdrawn from the Atlantic and Mediterranean fleets in the near future, in which case the ships thus released would go to build up a new reserve, though the admiralty are known to be strongly opposed to any further cut in the strength of those formations. This virtual abolition of the reserve fleet is a step that could not have been taken unless accompanied by similar action on the part of other naval powers, but, as the United States and Japan have both agreed to scrap all their second-line capital ships, the disappearance of the reserve fleet will involve no weakening of our relative position at sea.

One of the indirect effects of this measure will be to exalt the value of small craft for their knowledge that the battle fleet can neither be reinforced nor replaced in an emergency will certainly encourage the naval authorities to assign the smaller types of vessels a more important rôle in the general scheme of strategy and tactics than they have played up to now. Apart from a few capital ships which have either been withdrawn from the Atlantic or Mediterranean fleets or temporarily paid off for repairs, the reserve fleet will henceforth consist chiefly of aircraft-carriers, light cruisers, destroyers, and submarines. If the necessary funds were available for organizing periodical exercises by this force, in co-operation with the active battle fleet, our senior officers would gain much valuable experience in the tactics which are likely to govern naval operations in the new era, but it is to be feared that there will be no money to spare for this purpose.—*Naval and Military Record*, 19 April, 1922.

IMPERIAL AIRSHIP SERVICES.—Just in time to prevent the carrying out of the government's announced intention to dispose of our remaining airships, an offer to take them over and use them for the establishment of an imperial airship service was received from Commander C. D. Burney, supported by Vickers, Limited, and the Shell oil group. The scheme submitted contemplates at the outset a bi-weekly service to India, and later on an alternate-day service to India, with a weekly extension to Australia. The government is to hand over free of cost the four airships in its possession, all airship material and the airship bases, to supply wireless telegraphy and meteorological services, and to guarantee—in conjunction with the governments of India and Australia—the interest on the capital involved. The vessels taken over, it is proposed, should be used for

training and short journeys only, five new vessels of 3,800,000 cubic feet capacity being constructed for regular use on the extended routes. These vessels would have a maximum speed of 70 knots, but taking the average speed at 40 knots, they would enable Bombay to be reached in five and one-half days, and Perth, West Australia, in eleven and one-half. The promoters of the scheme believe that the services, after an initial experimental period, would become self-supporting, and finally show a good profit. They are not deterred by recent airship disasters, for they argue that they could have been prevented. In the case of *R-38,* they say, the disaster was caused by certain errors in the design, and, moreover, the performance demanded of the ship was far in excess of that required of a commercial vessel. The *Roma,* they urge, was lost because she was being subjected to speed trials at a height above the ground so low that it allowed no opportunity for recovery from even a trifling mishap.—*The Engineer,* 7 April, 1922.

THE FUTURE OF MALTA.—Although there has been no confirmation of the report current a few weeks ago that Malta was about to be placed under the admiralty jurisdiction, the government is known to be considering the administrative future of this island fortress, and it is not impossible that a change such as that indicated will be announced during the year. When the post of governor became vacant in 1919 it was widely rumoured that a naval officer would be appointed as the new incumbent, but in the end the choice fell upon that distinguished soldier, Field Marshal Lord Plumer. By all the rules of logic the governance of Malta should be in naval hands, for the strategic importance of the island is essentially maritime. It is a fleet base pure and simple, and responsibility for its defence in time of war would rest entirely on the navy. Unfortunately it is not the custom in this country to determine such matters on logical principles, and so, with our usual disregard for the fitness of things, we have had a succession of military governors for our most important naval strongholds. Nevertheless, it is believed that a break in this tradition is contemplated in the interests of economy, and that the next governor of Malta will be a naval officer.

Drastic cuts have already been made in the dockyard there, but we do not suppose there is any intention of allowing the station to deteriorate as a repairing base for the fleet. When the lords commissioners of the admiralty made their last inspection of Malta before the war they announced their purpose of "making full use of the facilities of this important and complete naval base, the value of which to the British navy is of a permanent character." It was further stated that such proportion of refitting and repair work would be assigned to the dockyard as to keep it in a normal condition of activity, thus rendering it at all times capable of attending to the needs in peace or war of any naval force cruising or operating in the Mediterranean.—*Naval and Military Record,* 5 April, 1922.

BRITISH AIR POLICY.—A question much discussed lately—to what extent developments in aviation may make naval warfare obsolete—was raised in the House of Commons March 16 in a debate on the naval estimates. Austin Chamberlain, Lord Privy Seal, outlined the present policy of the government on the question.

Mr. Chamberlain said he could imagine circumstances might soon lead the world to believe that limitation of battleships or armament would be of little use unless similar limitation was placed on aircraft. Therefore, he could only declare the government's policy as things stood at present.

Believing, as the government did, that the air force had immense potentialities, quite distinct from its duties as an adjunct to the naval and military services, and convinced that in the future the greatest danger to Great Britain might well be from an action by air forces, the government considered it would be a retrograde step to abolish the air ministry and re-absorb the air force into the admiralty and the war office.

Mr. Chamberlain announced that the standing committee of the committee on imperial defense, after long and careful inquiry, had arrived at the following conclusions:

First—That the air force shall be autonomous in matters of administration and education. Second—In case of defense against air raids the army and navy must play a secondary rôle. Third—In case of military or navy operations the air force must be in strict subordination to the general or admiral in supreme command. Fourth—In other cases, such as the protection of commerce and an attack on enemy harbors and inland towns, the relations between the air forces and the other services shall be regarded as a matter of co-operation.

Mr. Chamberlain added that the government had decided to appoint a committee to advise further how to secure the utmost efficiency in the air service.—*Aerial Age Weekly*, 3 April, 1922.

AIR ESTIMATES.—The following table gives an abstract of the air estimates, which were issued last week. The estimates show a net reduction on last year's figures of £7,516,477, the total for the coming year being £10,895,000. A reduction in the numbers of the R. A. F. by 9,704 is provided for.

	1922–23	1921–22	Decrease
Effective Services:	£	£	£
Pay, etc.	3,781,000	4,084,010	1,023,010
Quartering Stores, Supplies, and Transport	1,530,000	3,105,000	1,575,000
Technical and War-like Stores	1,295,000	3,758,000	2,463,000
Works, Buildings, and Lands	1,826,000	3,018,000	1,192,000
Air Ministry	680,000	915,467	235,467
Miscellaneous	85,000	191,000	34,000
Civil Aviation	(a) 364,000	(a) 880,000	516,000
Research	(a) 1,177,000	(a) 1,706,000	59,000*
Total Effective Services	10,738,000	18,305,477	7,567,477
Non-effective Services:			
Half Pay, Pensions, etc.	(b) 157,000	(b) 106,000	*51,000
Total	10,895,000	18,411,477	7,516,477

* Increase.

(*a*) Includes certain non-effective charges in respect of these Services.

(*a*) Includes certain non-effective charges in respect of these services. and experimental and research services. Those are included under votes 8 and 9 respectively.—*Army, Navy, and Air Force Gazette*, 25 March, 1922.

THE LOSS OF SUBMARINE "H-42."—At 9:30 in the morning of the twenty-third of the month the British submarine *H-42* was rammed and sunk by the destroyer *Versatile*, with the loss of all hands. The submarine was engaged in exercising off Europa Point, Gibraltar, and it appears that she came to the surface but a few yards ahead of the destroyer, which was steaming at twenty knots. There was no time to alter course sufficiently to avoid a collision, and the submarine was struck at right angles just abaft the conning tower. The *H-42* belonged to Portsmouth and was

attached to the submarine depôt ship *Maidstone*. She was a vessel of 440 tons surface displacement and 500 tons submerged, her dimensions being 171 ft. long overall, beam 15 ft. 6 in. and draught about 14 ft. She was built by Sir W. G. Armstrong, Whitworth and Co., Limited, in 1918, and her engines were constructed by Ruston and Hornsby. Her surface speed with 480 horsepower was thirteen knots, and submerged with 320 shaft horsepower she could make twelve knots. She had on board at the time of the disaster twenty-six officers and men.—*The Engineer*, 7 April, 1922.

SIR ROSS SMITH AND LT. BENNETT KILLED.—A terrible air disaster occurred at Weybridge on Thursday, in which Sir Ross Smith and Lieutenant Bennett lost their lives.

Sir Ross Smith, with the assistance of Sir Keith Smith and Lieutenant Bennett, was to have started on an attempt to make the first aerial journey around the world on April 25.

Sir Ross Smith was a noted airman. With his brother, Sir Keith Smith, he won the Australian government's £10,000 prize for a flight from England to Australia. The brothers were made Knights of the British Empire in recognition of this pioneer flight. Sir Ross Smith in 1914 sailed with the first Australian troops as a trooper. He won his commission in Gallipoli and after serving in Egypt in 1916, joined the Australian squadron of the royal flying corps and saw service in Palestine. After the armistice he was sent with General Borton to survey the route between India and Australia.—*Naval and Military Record*, 19 April, 1922.

PROPORTION OF OFFICERS TO BE RETIRED.—Delay in issuing the scheme of retirement for naval officers is, says *The Times*, due to the difficulty experienced in adjusting the fair and reasonable claims of the officers as set forth by the admiralty board with the limits which the treasury consider to be fixed by the urgent demands of economy. The number of officers to be retired has been under-estimated.

It was assumed when the admiralty announced that the flag list was to be reduced by one-fifth that somewhere about this proportion would rule in the case of the ranks, next below, and that there would be nothing like differential treatment. It is understood now that the proportion of captains and commanders to be retired will be more nearly one-third than one-fifth, or, roughly, 120 of the former and 200 of the latter rank.

The case of the junior officers will be still worse, as, owing to a decision not to retire any of the 600 lieutenant commanders, a large proportion of lieutenants must be sacrificed, and it is estimated that from one-half to three-fifths may have to go. Several hundred young officers will have to seek a new career.—*Naval and Military Record*, 19 April, 1922.

RETIRED PAY.—A fleet order states that the board have had under consideration the rates of retired pay to be granted to officers of the rank or relative rank of lieutenant commander or lieutenant who are retired for non-service under the age of forty years; provision for such cases not having been made in the revised scales of retired pay promulgated in M. O. 2483a/19.

The following rates have been approved for lieutenant commanders and lieutenants and officers of corresponding ranks in the engineer and accountant branches, exclusive of: (a) Officers on the supplementary list; (b) officers promoted from the rank of mate or mate (E); (c) officers formerly of warrant rank, promoted for long and zealous service; (d) officers, formerly of warrant rank, promoted for acts of gallantry or daring; (e) officers specially promoted to the rank or corresponding rank

of lieutenant during the war from warrant rank or commissioned officer from warrant rank.

Such officers if retired for non-service under the age of forty will be granted retired pay at the rate of £75 a year, with an addition of £7 10s. a year for each of the first six complete years' service, and an addition of £12 10s. for each complete year of service subsequent thereto in the ranks or relative ranks of lieutenant and lieutenant commander. Unemployed time and half-pay time will count as one-third for the purposes of the above scale.

The above rates of retired pay will be subject to review on or after July 1, 1924, in accordance with paragraph 41 of M. O. 2483a/19. The foregoing arrangements will have effect as from April 1, 1919.

The rates of retired pay to be granted on retirement for non-service at ages under forty to officers of the rank or relative rank of lieutenant commander or lieutenant who are not included in the scope of this order are under consideration and will be promulgated in due course.—*Naval and Military Record*, 12 April, 1922.

BRITISH EXHIBITION SHIP TO SAIL NEXT MONTH.—The steamer *Orontes* of 9,020 gross tons, heretofore engaged in the Australian trade, has been sold by the Orient line to a syndicate which is planning to convert her into an exhibition ship immediately. She is to be renamed the *British Trader*, and is scheduled to sail at the beginning of May on an eight-months' cruise covering 40,000 miles.

Comparatively few alterations are to be made in the vessel. It is intended to utilize the present extensive first and scond-class accommodations as living quarters and offices, while the steerage quarters and 'tween decks and holds are to be fitted up with 300 exhibition booths or stalls. Particular attention is to be paid to the machinery and motor trades.—*Nautical Gazette*, 22 April, 1922.

"MAJESTIC" REACHES SOUTHAMPTON.—The giant liner *Majestic*, the largest ship in the world, arrived at Southhampton on Monday last and will be delivered to the White Star line during the course of the week. On her trial run in the North Sea she proved herself ready for service in every respect, developing an average speed of 23 knots and 68,000 indicated horsepower.—*Nautical Gazette*, 15 April, 1922.

LLOYD'S SHIPBUILDING REPORT FOR FIRST QUARTER.—According to *Lloyd's Register of Shipping*, 955 merchant vessels of 3,679,622 gross tons were under construction at the end of March in the various maritime states except Germany. The showing by countries is as follows:

Country	No.	Gross Tonnage
Belgium	7	17,313
Brazil	1	2,170
British Dominions	38	63,502
China	7	8,170
Denmark	26	61,738
Esthonia	20	6,531
Fiume District	9	7,859
France	60	286,255
Greece	1	600
Holland	109	258,240
Italy	96	311,888
Japan	26	117,312
Norway	32	49,534
Portugal	14	5,983
Spain	13	54,707
Sweden	28	55,556
United Kingdom	437	2,235,998
United States	31	136,266
Total	955	3,679,622

Details of motorship construction are given in the next table:

Country	No.	Gross Tonnage
Brasil	1	2,170
British Dominions	1	100
Denmark	7	29,808
Esthonia	7	2,491
Fiume District	2	600
France	1	8,500
Greece	1	600
Holland	14	13,550
Italy	24	23,308
Japan	1	310
Norway	4	13,620
Portugal	3	1,700
Sweden	13	42,830
United Kingdom	29	133,991
United States	6	19,945
Total	104	293,523

The number of tankers under construction at the end of March, 1922, is shown in the following table:

Country	No.	Gross Tonnage
British Dominions	2	11,600
Fiume	2	3,284
France	6	40,460
Holland	3	9,766
Italy	7	41,800
Japan	3	18,400
Sweden	1	5,450
United Kingdom	64	416,654
United States	7	67,976
Total	95	615,390

—*Nautical Gazette*, 29 April, 1922

JAPAN

JAPANESE NAVAL CONSTRUCTION.—Although the Naval Limitation Treaty has not yet been ratified by Japan, work was cancelled as early as last February on the capital ships which are surplus to the agreement. This is evident from a statement issued early in that month by the Mitsubishi yard at Nagasaki, to the effect that in compliance with instructions from the authorities work must cease forthwith on the battleship *Tosa* and the battle cruiser *Takao*. Keen disappointment is expressed that the yard should thus be deprived of the opportunity of demonstrating its skill in equipping and completing the *Tosa*, which was launched a few months ago as the largest battleship in the world. This sentiment will doubtless be shared by the workmen in general, but their disappointment, the statement adds, will be mitigated when they remember that the decision has been prompted by a desire to promote the world's peace. Full preparations were being made at the Nagasaki yard for the building of further vessels similar to the *Tosa* and *Takao*, and the order to suspend these plans has created serious difficulties, as there is not nearly sufficient alternative work to maintain the number of men at present employed. A statement has also been issued by the Kawasaki yard at Kobe, where instructions were received on February 5 for the stoppage of all work on the battleship *Kaga* and the battle cruiser *Atago*. The former was then considerably more than half completed, and wanted only her armor, guns, and equipment. In the case of the *Atago*, however, the work done was limited to laying

the keel and assembling material. In order to avoid discharging the 3,000 men who had been engaged in the construction of these two ships, the yard management has decided to put them to work on two destroyers and twelve submarines, as well as on the light cruiser *Kinu* and the very fast cruiser *Jintsu*, which are already building there. In addition, two special service ships ordered by the navy for completion in 1925-26 are to be accelerated.

Unemployment threatens to assume such serious proportions in the Japanese shipbuilding industry that the various yards which undertake admiralty work are considering a scheme for pooling current and impending contracts for cruisers, destroyers, submarines, and auxiliaries, and alloting to each yard a share of work proportionate to its capacity. Should this scheme be adopted, it may be extended also to mercantile tonnage, for it is realized that exceptional measures will have to be taken if the national shipbuilding industry is to survive the crisis which has been brought about by naval disarmament.

The nine yards which at present have admiralty contracts on their books are the Mitsubishi, Kawasaki, Kobe Steel Works, Uraga Dock, Asano, Osaka Iron Works, Ishikawajima, Fujinagata, and Mitsui. Between them they employ 60,000 hands, and have sufficient material in stock to build 300,000 tons of shipping. The majority have enough work to carry them over this year, but after that they will not need more than half their present number of hands.

The light cruiser *Yura*, laid down at Sasebo dockyard in May last, was launched on February 15. Very little is known about this thip, which may be either a replica of the *Kuma* class, displacing under 6,000 tons, or the first of a new and heavier type of fast cruiser which the Japanese navy is understood to be developing. Including the *Yura*, there are now at least eight cruisers building in Japan, and eight others have been authorized, while twelve such ships less than ten years of age are already in service. Japan is therefore far ahead of the United States and second only to Great Britain in a type of vessel the importance of which is universally acknowledged.

In February last a collision took place between the light cruiser *Tenryu* and the seeond-class destroyer *Tsuta*. The latter, which had been completed only a few weeks previously, was seriously damaged.

In accordance with the Limitation Treaty the following ships have been ordered to be withdrawn from service with a view to being broken up: battleships *Shikishima, Asahi, Mikasa, Hizen, Katori, Kashima, Satsuma, Aki*, and the cruisers *Ikoma, Ibuki*, and *Kurama*. The *Mikasa*, however—Togo's famous flagship during the war with Russia—is to be moored at Yokosuka as a souvenir.—*Naval and Military Record*, 12 April, 1922.

JAPAN'S DEFENCE POLICY.—Now that the Anglo-Japanese Alliance has ceased to operate and its place has been taken by a treaty which investigation shows to be no effective substitute for the former defensive and offensive league which had existed between this country and Japan for twenty years, it is not surprising to learn that the Japanese naval and military authorities are endeavoring to adjust their defensive plans to the new strategic conditions with which they are faced. Since the wording of the Pacific Treaty, and particularly of the reservation inserted by the American Senate, makes it clear that the signatory parties are under no obligation to take up arms in defence of the principles enunicated in the document, Japan argues that she must henceforth rely entirely upon her own strength for the protection of those interests which she considers vital to her existence. According to messages from Tokio received early

in the present month, the military and naval general staffs have taken counsel together, and, in view of the Washington agreement, limiting the fortification of islands in the Pacific to the *status quo*, have resolved to make certain changes in their traditional policy. In future, therefore, the cordon of defence, which formerly extended well into the Pacific Ocean, will be reduced to a much narrower limit, and while maintaining such forces afloat and ashore as will be adequate to guard her coasts against attack from the west, Japan will pay special attention to securing her communications with the Asiatic mainland, whence in time of war she would have to draw no inconsiderable part of her foodstuffs and other essential supplies.

The news of this readjustment of defence policy has been interpreted in some quarters as an announcement of Japan's intention to extend her political and economic hold over China in order to compensate for the restrictions which the Washington agreement has placed upon her naval expansion. Time must show whether this reading of the facts is correct, but it seems premature at this stage to accuse Japan of contemplating a line of action that would be difficult to reconcile with the spirit of the treaties to which she has set her signature. Her strategical problems are in many aspects similar to those which we ourselves have had to solve in the past and may have to solve again in the future. As an island state, with important colonial possessions, she is primarily dependent on naval power for security against attack, and ever since she emerged from centuries of hermit-like seclusion to take her place in the ranks of the great powers, her aim has been to maintain a fleet sufficiently strong to ensure her supremacy in the Sea of Japan and its adjacent waters. This object she finally achieved after the war with Russia, since when no power has maintained in the far east a naval force comparable in strength with the Japanese fleet; while Japan on her part has done her utmost to discourage the creation of foreign naval bases on her side of the Pacific, realizing as she did that so long as such bases were non-existent she would have little to fear from attack, even by a would-be aggressor whose combined naval resources were far superior to her own.

A few years ago, however, the United States seemed disposed to establish large naval bases in the Philippine and Ladrone Islands. Although little was said openly, it is known that Japan was gravely perturbed at the prospect of having as it were, the United States navy brought to within easy reach of her coasts, a development calculated to threaten that local command of the sea which she has always regarded as something to be maintained at all costs. While it might be too much to affirm that the execution of the American fortification scheme would have been regarded by Japan as a *casus belli*, it was very widely believed in the far east that war between the two countries would have become simply a matter of time if the Americans had persisted in their plan. Without some clause relating to these Pacific fortifications the Washington naval agreement would have been practically valueless as a safeguard against war, and, in fact, would probably not have been negotiated at all; for it has just been revealed by the Tokio newspapers that the Japanese delegates made it clear at the outset that they attached infinitely more importance to this question than to the scrapping of ships. It was only after the United States and Great Britain had agreed to the Japanese proposal regarding the suspension of all further work on the insular naval bases in the Pacific that Admiral Baron Kato felt himself free to accept Mr. Hughes's drastic scheme for reducing the respective ship establishments.

The abandonment of the projected American bases in the Western Pacific is, of course, an enormous gain from Japan's point of view, but it cannot be said to have absolved her from the necessity of keeping up a

naval force strong enough to deal with any fleet that might be sent to make flying raids on her coasts and communications. All impartial observers must admit that the battle fleet with which Japan has agreed to content herself under the terms of the treaty is modest enough in view of the important part which sea power plays in her scheme of defence. She retains only ten capital ships in all, and four of these are battle cruisers of a design more or less obsolete. This fleet is so small and the possibility of reinforcing it in an emergency so remote that Japanese strategists will probably regard it as a last card to be played only as a *dernier ressort*. Their tendency in future will be to rely more and more upon those smaller and cheaper factors of naval defence, such as cruisers, submarines, and aircraft, in regard to which the treaty leaves them a free hand. Indeed, it is already known that the construction of such types is to be pushed forward with all speed, partly to relieve the industrial depression caused by the stoppage of capital shipbuilding and partly, no doubt, to make up by a substantial margin in auxiliary craft for the weakness of the battle fleet.

As regards Japanese military policy, the principles that govern it are somewhat obscure, for in spite of there being at present no visible menace to the island empire, she is maintaining an army of twenty-one divisions, with very large reserves in the background. It is true that the government is now considering the disbandment of several divisions, but it has been made clear that the money saved thereby will be spent on improving the equipment of the reduced army, which is notoriously deficient in certain items, such as heavy mobile artillery and tanks, which the Eureopean war showed to be indispensable for the conduct of a major campaign. There will consequently be no reduction in the cost of the Japanese army, nor will the cut in naval expenditure be so great as might have been anticipated, as the cost of the additional cruisers, submarines, etc., which it is proposed to lay down at an early date will make a large hole in the gross amount saved by cancelling the battleship programme.

What effect, if any, this new orientation of Japan's defence policy will have on her attitude towards China cannot be clearly foreseen at the moment, but there is no reason to assume that it heralds any further absorption of Chinese territory. On the other hand, Japan undoubtedly means to hold what she already has in the way of political and economic advantages and those who suppose that in signing the various Washington treaties she formally renounced her privileged position in China are sadly deceiving themselves. Rightly or wrongly, the Japanese think that they have made quite enough sacrifices to please America and England, and they show no disposition to accept further dictation as to their defensive or foreign policy from any quarter whatsoever. And in any case, seeing that the ink on the treaties is scarcely dry, it will be well to wait a little before lecturing Japan on her supposed designs in East Asia. So far, at any rate, nothing whatever has happened to give grounds for the suspicion that she does not mean to observe with perfect loyalty all the pledges into which she has entered. Those who assert the contrary have evidently read into the treaties much more than they really contain, particularly the one that relates to future international activities in China.—*Naval and Military Record*, 19 April, 1922.

UNITED STATES

NAVY DEPARTMENT, BUREAU OF CONSTRUCTION AND REPAIR WASHINGTON, D. C.

April 10, 1922.

VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY—Progress as of March 31, 1922

Type Number and Name	Contractor	Per Cent of Completion			
		April 1, 1922		March 1, 1922	
		Total	On Ship	Total	On Ship
BATTLESHIPS (BB)					
45 *Colorado*	New York S. B. Cpn.	90.7	90.	89.6	88.7
47 *Washington*	New York S. B. Cpn.	75.9	70.3	75.9	70.3
48 *West Virginia*	Newport News S. B. & D. D. Co.	78.	76.	74.	70.2
49 *South Dakota*	New York Navy Yard	38.5	31.6	38.5	31.6
50 *Indiana*	New York Navy Yard	34.7	27.2	34.7	27.2
51 *Montana*	Mare Island Navy Yd.	27.6	19.	27.6	19.
52 *North Carolina*	Norfolk Navy Yard	36.7	27.1	36.7	27.1
53 *Iowa*	Newport News S. B. & D. D. Co.	31.8	27.4	31.8	27.4
54 *Massachusetts*	Beth. S. B. Cpn. (Fore River)	11.	4.3	11.	4.3
BATTLE CRUISERS (CC)					
1 *Lexington*	Beth. S. B. Cpn. (Fore River)	33.8	24.2	33.8	24.2
2 *Constellation*	Newport News S. B. & D. D. Co.	22.7	19.5	22.7	19.5
3 *Saratoga*	New York S. B. Cpn.	35.4	28.	35.4	28.
4 *Ranger*	Newport News S. B. & D. D. Co.	4.	1.5	4.	1.5
5 *Constitution*	Philadelphia Navy Yard	13.4	8.4	13.4	8.4
6 *United States*	Philadelphia Navy Yard	12.1	7.1	12.1	7.1
SCOUT CRUISERS (LIGHT CRUISERS) (CL)					
4 *Omaha*	Todd D. D. & Const. Cpn.	99.2	94.8	99.2	94.7
5 *Milwaukee*	Todd D. D. & Const. Cpn.	94.9	87.9	94.4	87.
6 *Cincinnati*	Todd D. D. & Const. Cpn.	88.2	82.	88.1	81.8
7 *Raleigh*	Beth. S. B. Cpn. (Fore River)	64.9	47.6	64.2	46.6
8 *Detroit*	Beth S. B. Cpn. (Fore River)	82.8	70.8	81.	68.1
9 *Richmond*	Wm. Cramp & Sons Co.	89.	82.	87.	80.
10 *Concord*	Wm. Cramp & Sons Co.	85.	78.	83.	77.
11 *Trenton*	Wm. Cramp & Sons Co.	59.	47.	58.	46.
12 *Marblehead*	Wm. Cramp & Sons Co.	47.	33.	47.	33.
13 *Memphis*	Wm. Cramp & Sons Co.	40.	26.	40.	26.
AUXILIARIES					
Repair Ship No. 1, *Medusa* (AR1)	Puget Sound Navy Yard	79.3	70.8	77.6	69.8
Dest. Tender No. 3, *Dobbin* (AD3)	Philadelphia Navy Yard	69.9	69.6	68.1	67.8
Dest. Tender No. 4, *Whitney* (AD4)	Boston Navy Yard	51.8	45.1	50.9	42.1
Sub. Tender No. 3, *Holland* (AS3)	Puget Sound Navy Yard	21.5	5.5	21.5	5.5
PATROL VESSELS					
Gunboat No. 22, *Tulsa* (PG22)	Charleston Navy Yard	72.7	61.3	72.3	60.
DESTROYERS					
*339 *Trever*	Mare Island Navy Yard	99.8	99.8	99.8	99.8
340 *Perry*	Mare Island Navy Yard	95.2	95.2	90.7	90.7
341 *Decatur*	Mare Island Navy Yard	86.1	86.1	84.3	84.3

Destroyers authorized but not under construction or contract.
(12) Nos. 348 to 359 inclusive.
*Ready for commissioning.

There are three fleet submarines and thirty-eight submarines under construction.

There are six fleet submarines and one submarine authorized but not under construction nor contract.

NAVY INCREASES WIN BY LARGE MAJORITY.—By an overwhelming vote of 221 to 148 the House on April 19 defeated the efforts of the "little" navy men and voted to fix the navy enlisted personnel at 86,000, as demanded by Secretary of the Navy Denby and urged by President Harding.

The committee recommendation of 67,000 enlisted men, which was so signally defeated on April 15, was up for a record vote and members on both sides of the question were eager for a decision.

The House for the first time in many days was crowded to the doors and the galleries were filled to capacity. It was a gathering marked by numbers of women visitors to the D. A. R. convention, Annapolis midshipmen and officers of the navy.

After reading the bill for amendment, Representative Kelley, chairman of the sub-committee on appropriations, alluded to by Representative Dupre of Louisiana as the "wrecker of the navy," demanded a record vote on the personnel sections and on the subsistence amendment offered by Representative Swing of California, as well as a vote on the McArthur amendment increasing the various items for the pay of the navy.

Vote Is Cheered

When the vote was read by the speaker prolonged cheering resulted and the navy group was confident that its fight for an adequate navy would be sustained by the Senate. The McArthur amendment and the Vare amendment increasing the personnel to 86,000 men, 80,000 enlisted men and 6,000 apprentices, was sustained by a vote of 221 to 148. The Swing amendment increasing subsistence allowances was adopted by a *viva voce* vote.

The House increased the appropriation for the temporary government of the Virgin Islands from $250,000 to $343,440 on an amendment proposed by Representative Towner of Iowa. No opposition developed.

The first snag encountered developed over the discussion of the maintenance of the Dahlgren Proving Grounds, Va. Mr. Stephenson of Ohio, who was opposed to any fresh expenditures, introduced an amendment providing that "no part of the appropriation (for the bureau of ordnance) or any other appropriation shall be available for expenditure for the navy proving grounds at Dahlgren, Va., except as much as may be necessary in continuing the establishment on a closed-down basis." This was adopted.

In a discussion of the appropriations for the bureau of aeronautics Mr. Hicks of New York proposed that the appropriation authorized (of $5,475,000) by the committee be increased to $7,093,000. He asserted that the increase would provide only the necessary equipment for aviation and would not permit of the expenditure of funds for great extensions.

Amendment Voted Down

The House apparently was in no disposition to contest the committee attitude, and after limited debate voted against the Hicks amendment, 75 to 34.

Chairman Kelley, leading the fight for reduced appropriation, explained that between $8,000,000 and $9,000,000 would become available for aviation purposes later that could not be provided in the naval appropriation bill. This sum, he said, would bring the total amount for this purpose up to approximately $16,000,000.

Mr. Herrick, who has become somewhat of an interesting personality to naval officers stationed in and around Washington, and is a flier himself,

proposed an amendment to the $400,000 appropriation advocated by the committee for aircraft and accessories in course of construction or manufacture to $500,000. The amendment was for the purpose of building a government airplane factory to manufacture planes. This was lost on a *viva voce* vote.

An amendment by Mr. Lanahan of Texas proposed an appropriation of $400,000 for a helium plant. This was agreed to without dissent.

When the section of the bill dealing with the naval academy was reached a general free-for-all fight ensued between the big and the little navy groups. Speeches delivered by members centered largely around the proposed action of the committee in reducing the number of members of the 1922 class of midshipmen who were to be commissioned.

Civilian Instructors Retained

An amendment which started things going, proposed by Mr. Denison of Illinois, authorized an increase in the appropriation for the pay of professors and instructors from $346,500 to $421,500. It was for the purpose of retaining in the service the civilian instructors at the academy who have contracts with the navy department for terms of years.

Mr. Denison charged that the committee was seeking to throw these instructors out and supplant them with regular officers of the navy. His arguments finally won out after the House had fought over the proposition for nearly one hour and a half. Another amendment proposed by Mr. Denison was lost by a vote of 85 to 53. It provided that "no part of any sum in this act shall be expended in the pay or allowance of any commissioned officer of the navy detailed for duty as professor or instructor at the U. S. Naval Academy to perform the duties which were performed by civilian professors or instructors on January 1, 1922." This amendment would have produced the situation that no officers may be used as teachers in places provided by civilians.

In discussion of the naval academy needs the House engaged in a lively fight on the personnel section, Messrs. Kelley, Longworth of Ohio, Rogers of Massachusetts, and others participating.

Secretary Denby's Letter Read

Mr. Rogers demanded that Mr. Kelley produce Secretary Denby's letter showing the increases in appropriations that were called for under the increased personnel. Mr. Kelley balked and attempted to deflect the demand, but cries of "Read," "Read," came from members from various parts of the House, and he was forced to read the letter.

After an analysis of it by Mr. Mills of New York, Secretary Denby's letter showed that the increases would amount to approximately $39,500,000. But he contended that of this sum $19,000,000 was for increases called for in other sections of the bill which did not go into the personnel item.

"It's money got for increased activities of the navy because of the increased personnel," responded Mr. Kelley. He was drowned out, however, and the Denby letter, it was thought, swung the vote in favor of the increased personnel.

Reading of the bill was resumed and much progress was made until Mr. Byrnes of South Carolina sought to amend the section dealing with the increase in the navy by having stated in figures the amount of money necessary to be expended, which he said was $46,250,000.—*Army and Navy Journal*, 22 April, 1922.

$3,000,000 PROJECT AT MARE ISLAND.—The navy bill as reported to the House contains an appropriation of $750,000 to be immediately available to meet an emergency of a serious character that has arisen at the Mare

Island navy yard and which requires rebuilding timber wharves and quay walls with repair to dykes, to cost, according to an estimate of the bureau of yards and docks of the navy department, $2,800,000. Secretary Denby recently convened for the investigation of the situation at Vallejo a special board composed of Rear Admiral H. H. Rousseau, Captain F. P. Chambers, Commander George A. McKay, and Lieutenant Commander H. D. Rouzer, C. E. C. The condition at Mare Island on which the board was called upon to report arose from the presence of marine borers, principally the teredo, in San Pablo Bay and Mare Island Strait, within the last few years, that have attacked all wooden structures in those waters. Prior to 1913 the borers had never been reported in San Pablo Bay, and until September, 1919, there had been no evidence of damage from this source in Mare Island Strait proper according to navy yard authorities. Naturally, therefore, up to that time all wooden structures, both in San Pablo Bay and Mare Island Strait had been constructed of uncreosoted material, as the increased cost of creosoted material would not have been justified. The board examined the recent reports in the bureau files on the condition of the dykes, sea walls, wharves, etc., at the Mare Island yard, from which it learned that these dykes, quay walls, wharves, and various other waterfront construction of untreated timber have been damaged to such a degree within the last two and one-half years that portions have already collapsed, and the bulk of the remaining works are in imminent danger of failure, which may be expected to occur without warning at practically any moment. This condition is a serious menace to life and property and has necessiated placing certain portions of the navy yard waterfront structures out of commission. The report of the board stated as its unqualified opinion that there is only one course open in the way of remedy and that is to repair and replace the damaged structures with construction that will not be affected by marine borers, so as to maintain Mare Island on the same plane of importance and usefulness as before its structures were attacked, adding: "No lowering of this plane or lessening of the usefulness or facilities of the yard should be contemplated." It is proposed to expend $1,500,000 in rebuilding wharves and quay walls and $1,300,000 for repairs to dykes. The board also recommended that every effort be made to secure appropriations as quickly as possible, and it was with this information in his possession that Rear Admiral L. E. Gregory, chief of bureau, urged the appropriation of $750,000 as an initial expenditure.—*Army and Navy Register,* 15 April, 1922.

FATE OF NAVAL RESERVE FLIERS.—Charges that naval reserve flying officers were "thrown out like so much junk" by heads of the naval air service were made by Senator Walsh, Massachusetts, before the Senate naval committee, at an investigation of his allegations of unfairness by the navy in the examination given the reserve fliers. His resolution, adopted in December, asserted that the examinations for transfer were unfair and unreasonable and held that the individual ability of the officer was not given consideration.

Detailing his charges before the committee, the Massachusetts senator said that about 200 officers, mostly volunteers during the war, were about to be forced out of the navy because they had failed in examinations for which they had no opportunity to prepare and which included subjects wholly unrelated to aviation.—*Aviation,* 17 April, 1922.

BOARD'S MARCH DEFICIT.—The operating deficit of the shipping board was $3,704,155 last month as compared with $3,089,459 in February. The poorer showing is attributed to March being a longer month, with total voyages of 183, against 155 voyages in February.

The excess of outlay over income on voyage operations, excluding overhead, repairs and insurance, was $1,019,860, as against $593,290 for February.—*Nautical Gazette*, 29 April, 1922.

MARCH SHIPBUILDING OUTPUT IN DETAIL.—The bureau of navigation, department of commerce, reports 62 sailing, steam, gas and unrigged vessels of 6,203 gross tons built in the United States and officially numbered during the month of March, 1922, as follows:

	Atlantic and Gulf		Pacific		Great Lakes		Western Waters		Total	
	No.	Gross	No.	Gross	No.	Gross	No.	Gross	No.	Gross
WOOD										
Sailing	3	1,314	..	.....	..	.....	..	.....	3	1,314
Steam	..	.....	..	.....	..	.....	1	75	1	75
Gas	35	991	9	350	2	33	..	.....	46	1,374
Unrigged	7	1,941	2	354	..	.....	..	.....	9	2,295
Total	45	4,246	11	704	2	33	1	75	59	5,058
METAL										
Sailing	..	.....	..	.....	..	.....	..	.....	..	.....
Steam	2	831	..	.....	..	.....	..	.....	2	831
Gas	1	314	..	.....	..	.....	..	.....	1	314
Unrigged	..	.....	..	.....	..	.....	..	.....	..	.....
Total	3	1,145	..	.....	..	.....	..	.....	3	1,145
TOTALS										
Sailing	3	1,314	..	.....	..	.....	..	.....	3	1,314
Steam	2	831	..	.....	..	.....	1	75	3	906
Gas	36	1,305	9	350	2	33	..	.....	47	1,688
Unrigged	7	1,941	2	354	..	.....	..	.....	9	2,295
Grand Total	48	5,391	11	704	2	33	1	75	62	6,203

The above total includes 21 rigged vessels of 643 gross tons and 6 unrigged vessels of 1,430 gross tons, total 27 vessels of 2,073 gross tons built in years previous to 1922. There were not any steam or gas vessels of 1,000 gross tons and over built during the month of March, 1922.—*Nautical Gazette*, 15 April, 1922.

U. S. NEEDS MERCHANT FLEET OF 7,500,000 TONS.—On the supposition that the American merchant marine should be in a position to handle sixty per cent of our total water-borne commerce, the shipping board figures that on this basis there would be required a fleet composed something as follows:

	Gross Tons
Cargo ships and passenger and cargo ships	5,700,000
Tankers	1,400,000
Express passenger ships	400,000
Total tonnage	7,500,000

In explaining how this result was arrived at, the shipping board, in an official statement, said that the figure of 5,700,000 gross tons of cargo ships was arrived at by a method of proportion using actual figures of present operating vessels. As a check against this method we may compute the tonnage required from the purely theoretical standpoint, estimating the distribution of our exports and the number of voyages per year in the various routes. This would give a table something as follows:

Route	Tons Exports	Voyage Per Year	Voyage Tons
Middle America	4,500,000	10	450,000
United Kingdom & Atlantic Europe	8,500,000	5	1,700,000
Baltic, Mediterranean, Europe, W. C. S. A.	19,500,000	4	4,875,000
East C. S. A., Trans-Pacific, etc.	4,500,000	3	1,500,000
Long hauls, indirect, etc.	3,000,000	2	1,500,000
	40,000,000		10,025,000
One-half	20,000,000		5,013,000
			Deadweight
With assumed attainable efficiency of 60 per cent of total dwt. per voyage, it would require			8,333,000
Converted to gross			5,600,000
Plus tankers			1,400,000
Plus express passenger ships			400,000
Total gross tons of ocean-going ships			7,400,000

—*Nautical Gazette*, 15 April, 1922.

PERCENTAGE OF JANUARY'S TRADE CARRIED IN U. S. SHIPS.—According to figures compiled by the department of commerce, American flag vessels carried 32.99 and 38.99 per cent respectively of the ocean-borne imports and exports of the United States during the month of January. As regards tonnage entered and cleared 50.4 per cent of all merchant ships entering American ports flew the Stars and Stripes, while 51.45 per cent of those clearing were of United States registry.

In January a year ago American vessels carried 39 per cent of the imports and 36 per cent of the exports. The better showing in the export trade last January is said to be due to the Russian relief movement.—*Nautical Gazette*, 1 April, 1922.

PANAMA CANAL TRAFFIC.—During February 212 commercial vessels of 710,548 net tons passed through the Panama Canal carrying 838,074 tons of cargo. In the corresponding month of last year, 241 ships of 764,519 tons and carrying 882,313 tons of cargo passed through the waterway. The showing by countries was as follows:

Nationality	No. of Ships	Net Tons	Tons of Cargo
British	74	255,414	276,073
Chilean	5	8,926	4,534
Danish	2	6,569	10,610
Dutch	4	11,042	16,773
French	5	16,040	17,430
German	6	18,846	18,061
Japanese	9	40,220	57,176
Italian	2	5,822	1,110
Norwegian	9	26,185	40,337
Peruvian	4	6,042	4,453
Swedish	4	7,018	11,388
United States	88	308,424	380,129
Totals	212	710,548	838,074

—*Nautical Gazette*, 22 April, 1922.

SUGGESTED CHANGES IN U. S. NAVIGATION LAWS.—The shipping board has made public the findings of the Franklin committee on revision of navigation laws, which for some unknown reason has been kept secret for two years. The recommendations are unimportant, holding that the laws as they exist should be changed in minor details but that they do not constitute as serious a handicap to American shipping as they have been represented to be.

Among other features the board recommends a codification of our navigation laws and the issuance of more lenient regulations by the steamboat

inspection service. It also advises that Section 13 of the Seamen's act be amended so as to reduce the preliminary service required before men are to be rated as able seamen and the percentage of able seamen required in the deck crews.

A change is also suggested in the section of the La Follette act requiring masters to pay sailors half of their wages, which should be amended so as to reduce the prescribed payment to one-quarter of the wages due. Only one payment should be made in the same harbor on the same entry. It is also urged that seamen be provided with continuous discharge books. —*Nautical Gazette*, 8 April, 1922.

PRESENT STATUS OF BOARD'S STEEL VESSEL FLEET.—In his address on Tuesday to the joint congressional committee on behalf of the administration's ship subsidy bill, Chairman Lasker said that the government-owned steel fleet is divided as follows: Passenger ships, 500,000 tons gross; freighters, 6,000,000 tons gross; tankers, 550,000 tons gross.

Of the passenger ships, 300,000 tons are ex-Germans, of which 140,000 tons are so old as to be of no potential continuing value; their life is but short, and they can be, by and large, only academically considered an asset. Of fast cargo ships, we have but 15 ships of a total of 116,000 gross tons.

In passenger tonnage, both governmental owned and privately owned and including ships designed for the short runs to the West Indies, we have but 80 good ships, aggregating 600,000 tons; while of fast cargo ships of both classes we have but 53 ships of 390,000 tons.

To have a merchant marine that can effectively meet 50 per cent of all our peace-time carrying needs, we require a million and a quarter gross tons of passenger ships and about the same amount of the faster cargo ships.

Of our 6,000,000 tons of freighters, about half the steel tonnage is good tonnage, comparable to the best in the world. The other half ranges from fair to not usable for our purposes and should be either sold abroad for use in such trades where we have every assurance it will not find itself in competition with our ships, or dismantled.

Of the six million tons of freighters the government possesses, it is the hope of the shipping board that ultimately a great measure of the three million good tons will find itself in the hands of American owners, should the legislation now proposed be adopted. It is doubtful if, under the happiest conditions, the American flag will need the three million good tons in its entirety, and ways and means must be found to dispose of such of the good tonnage as remains, so that American interests will not be hurt.

Automatically the three million poor tons must be done away with. Part of it can be used by selling to Americans the hulls at low figures for conversion to types of freighters of which we are not possessed. The balance may either be sold in small quantities in local trades abroad if any, where, because of shorter runs and cheaper labor, local operation may be possible, or it must largely be dismantled.

In the genuinely competitive ocean-carrying trade in December, a normal month, American ships carried only 24 per cent of American exports. It is appalling to think that 19 per cent of this 24 per cent was carried in government-owned ships and only 5 per cent in privately-owned ships, when it is considered that the government, through the shipping board, admits its inability to operate on an equally efficient basis in competition with the private ships of the world.

We are carrying 87 per cent of the Mexican oil trade and 57 per cent of the Carribbean trade, but vessels designed for these trades are not of the types needed for naval auxiliary use in war.—*Nautical Gazette*, 8 April, 1922.

PIERS AND BERTHING SPACES FOR SHIPS.—In his report on water terminals and transfer facilities, Captain F. T. Chambers of the United States navy, says that in the United States by far the greatest percentage of berthing space for ships is in the form of piers, and beyond a doubt the present tendency to comparatively long and narrow row piers is a growth from conditions natural enough in the past, but now so far modified that those contemplating water-front improvements should weigh the facts carefully before deciding upon such construction.

The pier has an advantage over the wharf or quay construction in that it furnishes two berths, one on each side. Thus where little water front is available a much larger number of berths can be constructed upon the pier system than upon the quay system. It has the disadvantage that projecting at right angles, or nearly so, into the stream it is difficult to maneuver vessels into or from their berths except at slack water, with the further disadvantage that for modern ships of large capacity there is in general not sufficient width opposite the ship's berth for the accommodation of the enormous quantity of cargo which must be handled in and out.

Piers of moderate width are quite suitable for fitting out berths for ships at a shipyard, or even for accommodation of cargo of small vessels, but it should be borne in mind that within the past few years the sizes of ships have increased enormously, and that it is now considered that for overseas business ships of 10,000 tons deadweight capacity are the most economical.

The port of Jacksonville furnishes an effective comparison between pier and quay layouts for port terminal construction. The river at Jacksonville is none too wide for the manipulation of large ships, and had the city of Jacksonville in the early days acquired the entire water front on both sides of the river it would have made available about ten miles of water front for a port layout. The transit sheds would then have been built parallel to the water front and the railway brought in directly behind, with ample space reserved for classification and makeup yards. Furthermore, the largest ships could, under their own steam, have made their berths alongside the quay with ease, as they would have been pointed directly into the current.

Instead of this, industrial concerns for whose operation direct water-front connection is not essential, or which could under the quay system have been placed directly behind the railroad, quite as convenient to the water front as with the pier system, have acquired water-front property, and they, the railroads, and individuals have thrust narrow piers into the stream in the uneconomical American fashion.—*Nautical Gazette,* 28 April, 1922.

LARGE LINERS SHOW PROFIT.—According to T. H. Rossbottom, general manager of the United States lines, the steamships *America* and *George Washington* earned a profit of $686,292 in the four months ending December 31 without making any allowance for depreciation or insurance charges.—*Nautical Gazette,* 22 April, 1922.

LOS ANGELES DEVELOPING INTO GREAT OCEAN PORT.—The last few years have witnessed a tremendous growth in the business of the port of Los Angeles. In 1919 its commerce barely reached 2,000,000 tons, while last year the total cargo movement approximated 4,800,000 tons. This was 500,000 tons more than in 1920.

Los Angeles is now connected by direct line with practically every port of importance in the world. In the last twelve months twenty-three new steamship services have been inaugurated out of the port. Of these the principal ones are the Compagnie Generale Transatlantique, to Havre;

the Robert Dollar line, to the Orient; the British India East Asiatic line, to Copenhagen and Hamburg; the Wilson line, to the United Kingdom and European ports; the Java-Pacific line, from Java and the Philippine islands; the Luckenbach Company's line, to Mobile and New Orleans; the Matson Navigation Company's line, to Hawaii; the Nippon Yusen Kaisha, to the Orient; the Isthmain line to Honolulu; the Diamond line to the United Kingdom and European ports; the American-Australasian line, to New Zealand and Australia, and the Struthers and Barry line, to Hawaii and the Orient. Every available slip and foot of dockage is now occupied and the city is engaged in spending millions of dollars widening the entrance to its harbor, building new wharves and dredging new channels to care for the business being offered.—*Nautical Gazette,* 15 April, 1922.

AERONAUTICS

PORTUGAL TO BRAZIL FLIGHT.—Captains Sacadura Cabral and Gago Coutinho, of the Portuguese naval air service, have been forced to abandon their gallant attempt to reach Pernambuco, Brazil, when their seaplane was severely damaged upon beaching at St. Paul's Rock, in the South Atlantic, which the two fliers reached after a twelve-hour flight over a stretch of water devoid of any land.

The two fliers flew on April 17 from St. Vincent, Cape Verde Islands, to Porto Praya, in the same archipelago, a distance of about 200 miles, which they covered in two and one-half hours.

They left Porto Praya at 5:50 A. M. on April 18 heading for St. Paul's Rock, about 900 miles away, where they landed at 8 P. M. On landing the machine was unfortunately damaged to such an extent that it became impossible to resume the journey in the direction of Fernando Noronha, 350 miles away, whence only 378 miles separated them from the South American mainland.

The seaplane *Lusitania* which Captains Cabral and Coutinho were flying was, as has been foreshadowed in *Aviation,* the special type of Fairey floatplane which was recently launched in England.

This seaplane is a modification of the *Fairey C3D,* and has a span of 62 ft. and an overall length of 36 ft. 6 in. The engine is a 375 hp. Rolls-Royce "Eagle" and the fuel supply permits of a continuous flight of 18 hours. At the trials in England the machine developed a high speed of 95 m.p.h. with a wing loading of over 10 lb./sq. ft. and a power loading of 19 lb./hp., and the low speed 48 m.p.h. The weight empty is 4,150 lb., and the weight loaded 7,250.

According to latest advice, the Portuguese government has decided to ship a new seaplane to St. Paul's Rock so the two aviators may complete their flight to Brazil, a matter of 700 miles with one intermediate stop.—*Aviation,* 1 May, 1922.

OUR STORED HELIUM SUPPLY.—The helium plant at Fort Worth, Tex., was shut down December 1 last owing to lack of funds. At the time it was shut down, it had been operating in a fairly consistent manner, and had produced helium in notable quantities for a period of several months. The total production by this plant was about 2,100,000 cu. ft., and the total amount of helium which the navy has in storage is between 2,300,000 and 2,400,000 cu. ft. In one day (24 hours) the plant produced over 40,000 cu. ft. of helium.

There are still a few adjustments which are needed, and undoubtedly increased efficiency can be obtained in the future after further operation.

The army bill was recently presented to Congress with an appropriation of $400,000 for helium. It is hoped that the navy bill will be reported out

with an equal amount, giving a total of $800,000. If this amount is granted it will be possible to operate the plant at Forth Worth the larger part of next year, and this should give an amount of helium sufficient to take care of immediate needs for both the army and the navy.—*Aviation*, 17 April, 1922.

MEETING OF N. A. C. A.—A complete and detailed study of the plans and specifications of the navy's rigid airship *ZR-1* was requested of the national advisory committee for aeronautics at its session on April 20 by Rear Admiral Wm. A. Moffett, chief of the naval bureau of aeronautics. Before the airship, whose parts are now being fabricated, but which has not yet been assembled, is completed, Admiral Moffett is desirous of having a thorough study made of all the stresses and strains it is likely to encounter in the air under service conditions and it is for this reason that he has asked the committee to appoint a special technical subcommittee of aeronautical experts and engineers to make a special study of its design and structure. While the navy is confident that its own plans for the aiship are correct, it is nevertheless desirous of securing the opinion of an independent committee of experts to avoid the possibility of future adverse criticism. The whole committee approved Admiral Moffett's request and authorized its chairman, Dr. Walcott, to appoint a special technical subcommittee for this purpose.

Dr. J. S. Ames, chairman of the executive committee, reported on the progress made at the committee's research laboratory at Langley Field in the development of a new heavy-oil, fuel-injection aircraft engine for the bureau of aeronautics, navy department. While the details of the development are still held confidential, it is known that its use will greatly reduce the fuel fire hazard in aircraft. This new engine not only does away with the use of gasoline, but also operates without carburetor and spark plugs, thus eliminating certain causes of trouble.

Dawings and performance characteristic of a new high-speed airplane wing, just developed at the committee's labtoratory, Dr. Ames stated, have been turned over to the army air service for use in the design of a new high-speed pursuit type airplane. This new wing is a thick wing section with space for internally bracing the wing and eliminating any wires or struts in the design of the airplane. The wing is both tapered in section and in plane form, conforming somewhat to the general shape of a bird's wing that is tapering toward the tip, both of which features add materially to the speed characteristics of the wing.—*Aviation*, 1 May, 1922.

SIX KILLED IN COLLISION IN FRANCE.—The first disaster on the commercial air routes between England and France occurred on Friday afternoon with the result that six people were killed and one person gravely injured.

The French machine was the *Goliath*, F. G. E. A. D., belonging to the Grands Express Airiens, which left Paris at noon under Pilot Hire, who was accompanied by a mechanic, with three passengers and goods, and when in the region of Thienloy St. Antoine, near Grand Villiers, it collided with the *De Havilland 18* machine G. E. A. W. O., belonging to the Daimler Hire, Ltd., which left Croydon for Paris at 10 o'clock with goods and mails, and was piloted by Lt. R. E. Duke, who is stated to have been accompanied by only a steward.

A telegram received by Le Bourget from the chief of the gendarmerie at Grand Villiers states that the accident happened at 1.20, and that both machines are completely destroyed. "Six are dead, and one is in a critical state," the message adds.

It is stated at the air ministry that at the time the collision is said to have taken place the visibility was fairly good, but there were low

clouds and light rain,, and that possibly the machines were caught in a current.

Pilot Duke had a splendid flying record during the war, and had been for a long time engaged in civil aviation. He was a pilot in the Aircraft Transport Travel Co., which were the pioneers of commercial aviation, and had only recently joined the Daimler Co., immediately previous to which he was employed by the Royal Dutch Co. on the Amsterdam route.

The British machine formerly belonged to the air ministry, and was let on hire to the Instone air line. A few days ago she was acquired by the Daimler Hire Company, and this was her first flight under the new company.

The *De Havilland 18* was a single engine biplane, capable of carrying eight passengers and 500 lb. of baggage. She had an endurance of 3¼ hours, giving a range of about 400 miles.

An official of Daimler Hire, Ltd., said last night that the machine had been on the Paris air service for over two years. "Owing to the delivery of our own machines not being up to date," he added, " the *De Havilland 18* was loaned to us by the air ministry. It is not one of the machines of the type that we are using in our passenger air service." She carried only mails and newspapers, and the only person on board, according to this official, was the pilot Duke.—*Naval and Military Record,* 10 April, 1922.

THE USES OF AIRPLANE CARRIERS.—The organization for naval air operations requires that many squadrons of airplanes can be put into the air at short notice, and naturally arrangements must be such that this can be done as promptly in a gale of wind as in fair weather. Airplane carriers answer this purpose because they are the only means by which airplanes may be used with the fleet in sufficient numbers and in all kinds of weather.

Airplane Carrier Is Floating Airdrome

Airplane carriers not only carry at sea a large number of planes—in other words, a much larger number that can be carried on the present type of ships—they also provide a means for getting them back after they have taken the air. Even if it were practicable to have planes land on the water alongside of a ship, with the idea of picking them up by means of a derrick, it must be remembered that in time of war the ships at sea must go at the maximum speed, and also zigzag. It was impracticable to pick up an ordinary boat under these conditions, and more impracticable to pick up a delicate airplane.

The radius of action of all planes, including bombers, is very limited, and bombing planes have to be protected by fighters. The airplane carrier is thus a large floating, mobile airdrome. It differs radically from the ordinary airdrome in that it is a means of putting into effect the offensive qualities of aviation, on which so many claims are being made, including a great many extravagant ones. The bombing of ships from shore, provided the ships come within the radius of action of land planes, is perfectly feasible and easy, but before this, the land plane, or whatever type of plane is used, must have a base from which to operate, at least in the present state of development of aviation.

A plane can take the air from the deck of a ship—using a catapult if the available length for take off is short—no matter how bad the weather may be. But a seaplane can take the air from the surface of the water only when the sea conditions are favorable; the sea must be smooth enough for the plane to be able to work up to flying speed while running on the surface. This means a water speed usually greater than the speed of the fastest trans-Atlantic steamer; consequently we cannot hope to improve matters very much by increasing the size of seaplanes; it is well known

that the state of the sea frequently forces the largest steamers to slow down.

Developed by Practical Experience

The airplane carrier has been developed by practical experience in naval air operations. At first, in the late war, seaplanes were carried on tenders from which they were hoisted overboard to take the air from the surface of the water. Used in this way the airplane was naturally unpopular with the navy, for, as explained above, it was of necessity a fair weather apparatus. The next step was to put airplanes with wheels on extemporized platforms built on tops of turrets of the fighting ships; this was a step in advance because the planes taking off from the platforms did not have to wait for smooth sea conditions, and consequently could operate in bad as well as good weather. But in this kind of operation, there was no satisfactory means of recovering the planes after flight, and there was not enough available space for platforms to permit operation of a sufficient number of squadrons. The next step was the carrier with a flying-on deck as well as facilities for flying off the deck. The use of carriers made it possible to increase the number of planes operating with the fleet, and made it possible to recover planes after they had finished their flights.

Catapult Supersedes Flying-off Platform

In the United States navy the flying-off platforms on turrets have been superseded by catapults which permit operation of more efficient planes from the fighting ships than was possible from the platforms. The length of run on the catapult is about the same as with the turret platform, but the mechanism of the catapult assists the plane to get up flying speed in the short run; consequently we can now use much faster or heavier planes than was possible with turret platform. The catapult also makes it possible to use planes on all types of ships, whether there be provision for this purpose or not.

Resuming it may be said that the airplane carrier is simply a means of furnishing transportation for planes over the sea, instead of restricting them to operations within a few miles of the shore. The putting of catapults aboard, and the placing of planes on ships, necessarily of a restricted number, is well enough, and in doing it the navy is doing the best it can with the means at hand. It is believed that battleship design will ultimately be radically modified so that they carry fewer guns, and the number of guns sacrificed will give a part of the deck space to planes, and re-arranged so that they can carry a greater number of planes. All wars are setttled by gaining control of the sea, and this control is in the ultimate analysis generally gained by a fleet action, so that one must think of aviation as taking a rôle which in its own province, must on a very large scale, be decisive. Hence in order to carry planes in large numbers the airplane carrier is essential.—*Aviation*, 17 April, 1922.

"CURRENIUM"—WHAT IS IT?—Newspaper reports announce the production in Los Angeles of a new lifting gas, called currenium, which, it is claimed, is non-explosive and non-inflammable, and for which the further claim is made that its lift is essentially that of hydrogen.

In this connection George B. Harrison, formerly secretary of the Aero Club of Southern California, has favored us with the following communication, which is published for the sake of information.

"Currenium, a new gas which is non-explosive and non-inflammable and which can be manufactured cheaply, has been developed by the International Transportation and Manufacturing Co. It is the discovery of Dr. E. Curran, chief of the research department of that company. He has been experimenting for more than twenty years to devise a means of pro-

ducing a non-inflammable lighter-than-air gas, and in 1918 practically perfected such a process. Since then he has been developing the method of quantity production of the gas in order to attain a low priced method of manufacturing with the assurance of constant purity.

"A lift equal to that of 98 per cent hydrogen is claimed for the new gas, with a much better maintenance of purity than is possible with hydrogen. Dr. Curran has kept the gas in an airship compartment of his own design for more than a year without noticeable loss of purity. He asserts that the gas may be manufactured at less than $40.00 per 1,000 cu. ft., and that its production is feasible whenever machinery can be installed.

"Tests of currenium have been made at Los Angeles, which were witnessed by members of Aero Club of Southern California and of the Commercial Aircraft Association of Southern California, in which a flame and electric spark were introduced into the gas without causing fire or explosion, and after which small balloons were filled to demonstrate its buoyancy. The actual lift of the currenium is almost that of hydrogen, but better than helium."—*Aviation*, 17 April, 1922.

THE WORLD'S NEW AIRSHIPS.—Major G. H. Scott, who commanded *R-34*, is one of the officers interested in the development of an imperial air service, whose naval and military usefulness is obvious. On this question of our own airships now for disposal he has some very clear views which have been put before the air conference recently. If not now, then in the immediate future, our own policy must be shaped by what other nations are doing with regard to airship work, and this Major Scott has tabulated.

Owing to the incentive of the war, the airship has been brought to that state of development where it may justly be said to take its place amongst the useful inventions of the world. Like all other engineering achievements which have reached such a stage, there can be no question of it standing still; it is certain great efforts will be made to establish it as a means of long distance transport, and to utilise it for defence purposes. British airships are in a peculiar position, says Major Scott. The British public really know little about their great possibilities, as although our existing airships are capable of carrying out long flights of three to four days, it has been impossible to demonstrate the commercial value and possibilities of this performance, as no ground organization is available outside Great Britain. The public in this country have seen nothing but the irregular, although long, flights carried out by our ships.

The airship position in this country has now reached a critical stage, and issues of vital importance to the empire depend upon the steps which we take now. There can be no doubt that the world will continue the development of the airship, and eventually airships will be flying commercially on all the main world routes. Major Scott holds the view that if a move is not made now one will be forced on us at no distant date, probably within two years. His reasons for thinking that if a move is not made now by this country, it will have to be made within two years, are based not on any revolutionary improvements in air ship design, but on the airship position in other countries.

The United States naval department have arranged with the Allies for the construction of an airship by Germany at the Zeppelin works as part of America's share of aerial reparations. This ship, we may take for granted, will embody the latest features of airship design, and should be flying within twelve months. The United States navy department are also building in America the *Z.R.I.*, modelled on a German ship. The U. S. Army have recently purchased an Italian semi-rigid ship, which is

the largest airship of its type in the world, and have also in commission several smaller non-rigid airships. With such a programme progress will be very rapid. A large base at Lakehurst has been erected; it has a shed with twice the floor space of anything in this country, capable of housing ships three to four times the size of any built to date. There are also several other bases in being and in use by the army and navy authorities, notably Langley Field. It is also known that a powerful commercial combine exists in America today, with a view to running commercial airships, probably in the first instance trans-continental—the Atlantic being considered a later development, says Major Scott.

The re-erection of three large sheds in France, which were taken from Germany under the peace terms, is proceeding. These sheds are being erected, one near Paris, one near Marseilles and one in Algiers. These, together with the two existing bases at Maubeuge and Marseilles, will place France in a very strong position, when she can finance the construction of ships (which undoubtedly is her present intention), both from an international traffic point of view and for the operation of an airship service from Paris to her principal colony. There is abundant proof that the Germans are firm believers in the future of airships. They have, in various ways, managed to keep their technical staff together, and are still in a position, technically, to design and construct airships. The latest move, and one which will give them what may well turn out to be a commanding lead in airships, is the arrangement now being completed between Spanish commercial interests and Zeppelin interests to establish an airship service between Spain and the Argentine. There is no reason why the first leg of this route, say, to Las Palmas, should not be operating within two years from now in spite of the fact that a shed must be erected in Spain, and quite possibly in this time the service may have reached Brazil. Italy recently constructed a 1½-million cubic feet semi-rigid, which America has purchased. They are now engaged in building a still larger airship of this type, which will have a range of about 4,000 to 5,000 miles. Italy also has under consideration a commercial airship service from Rome to her North African colony, Tripoli.—*Army, Navy and Air Force Gazette*, 22 April, 1922.

THE UNIFIED AIR FORCE VINDICATED.—Opponents of the idea of a single fighting air service, controlled by a separate air department, independent of, and co-equal in status with the war and navy departments will do well to ponder over the speech recently made in the House of Commons by Austen Chamberlain, speaking for the British government. The most important portions of this speech are reproduced elsewhere in this issue, but it seems worth while quoting here a few of its high lights, for they make clear why Great Britain does not intend to "wash out" her unified air force—as the admiralty had hoped would occur.

If the royal air force were to be reabsorbed by the army and navy, said Mr. Chamberlain, "sailors and soldiers would continue to think of the force in terms of their own service and would not pursue its development as an independent force outside the purpose with which it was associated, and for which they desire that it should be employed."

This is an argument which has been put forth many times, but we do not believe that it has ever before been expressed in such a clear and convincing language. And it was precisely because soldiers and sailors "thought in terms of their respective services," and not in terms of air warfare, that the British government created in the pressure of war the air ministry and the royal air force. "Until that time the air was purely under naval or military command, and was only thought of in terms of naval and military warfare," said Mr. Chamberlain, and it was only after the air ministry

was constituted with its air staff that "the aeronautical aspects of war were considered from an aerial point of view."

This was the situation which Great Britain found wanting in 1918 and remedied despite considerable opposition from the Senior Services. The opponents of the innovation then claimed that before long the unified air force would again be split up into its constituent parts and handed back to the war office and to the admiralty. Today, however, there can no longer be any doubt that the much criticized single air force idea was right. It is generally agreed that in the future hostilities will open up with a surprise attack from the air, and that this situation must be met by an air force which will consider the matter from an aerial and not a naval, or a military viewpoint. Hense the second conclusion the British government has arrived at with respect to national defense: *That in the case of defense against air raids the army and the navy must play a secondary rôle.* This means, in other words, that the royal air force is today Great Britain's first line of defense, while the navy is relegated to secondary place.

Students of national defense cannot afford to ignore the significance of the upheaval that has taken place in the traditions of a country which like Great Britain has for centuries chiefly relied on its naval service for keeping its shores inviolate of enemy attacks.—*Aviation,* 17 April, 1922.

AMUNDSEN TO TAKE AIRPLANES TO POLE.—Captain Roald Amundsen, the polar explorer who is soon to start on another venture into the Arctic Ocean, will use two airplanes in connection with his expedition. One of these, a *JL-6* metal monoplane, is to be used for the final dash to the North Pole, while the other machine, an Avro *504-K,* is to be employed as an advance scout of the ship for spotting icebergs, free water, etc.—*Aviation,* 10 April, 1922.

AIR SERVICE PLANS FLYING AIRCRAFT CARRIERS.—The air service is developing plans for aerial aircraft carriers, it is learned in Washington. Means and methods for launching and taking on board small airplanes, carrying gas, ammunition and bombs for distribution to its fleet of planes, are being studied in connection with the employment of large airships by officers of the army air service.

"What the air service needs to day," said one officer, "are lighter-than-air transports for carrying personnel, equipment, spares, gas, and oil, with facilities for picking up and dropping planes, so that the pilots and observers can be relieved in the air, the planes gassed, and ammunition and bombs supplied, without necessitating a return to a land or ship base. Just as the air craft of the navy are cared for by a mother ship or airplane carrier, so must the army craft be supplied from an aerial mother ship," he continued.

Originally Planned with *Roma*

"We were making just such plans for experimenting with the *Roma,* but with the delay of getting her into shape and the installation of six new Liberty engines, we had not yet undertaken experiments when she was destroyed. Now we are without a ship with which to conduct our tests and trials, which are based upon sound reasoning and are still believed practical," he said.

The bombing tests off the Virginia Capes last summer, it was pointed out, revealed the fact that airplanes could keep a sea fleet at bay when met at the coast line, or 200 miles out at sea, but it was explained, the planes had to return to their base for a new gasoline supply and for additional bombs, which required considerable time and consumed a lot of fuel. With an aerial supply cruiser such as has been outlined, there

would be no limit to the distance off the coast to which land planes could operate without returning to land, remaining at sea continually. Even small pursuit planes could be so used, it is said, enabling a defensive air force to meet the combat planes of an enemy fleet well at sea, while their mother airship remained aloof and secure from attack at a given loaction not too distant from the scene of action.

Another use of the aerial transports would be for quick concentrations of air forces at a particular spot lacking in supplies and fuel. The planes could probably reach the spot independently and the mother airship would soon be on hand with the spares, gas and ammunition enough for a long engagement. Nothing would prevent the ships of the air from taking the war into the enemy country with such a portable supply base, it was explained.

Secretary Weeks's Views

The possible use of airships for this purpose was mentioned for the first time by Secretary Weeks in commenting on the replacement of the *Roma*. He only mentioned, however, the value of taking airplanes to a distant zone of action, without passing over territory of another power en route.

An aerial aircraft carrier, might also be of considerable value in times of peace, it was pointed out, when it became necessary for example to send a number of short distance aircraft to the Canal Zone. A ship like the *Roma* could have carried several planes suspended from her rigid keel, sailed either down the coast or by a sea route to the Canal, thus avoiding a flight over the confines of another country where national or international aerial laws might prohibit the flight of foreign military aircraft. Airplanes with short cruising radius could not accomplish such a trip without breaking any such existing laws.

Although no experiments had yet been conducted in connection with the development of large lighter-than-air carriers, the plans of the army air service contemplated experiments with the *Roma* in dropping and picking up small pursuit planes while in flight. Just as soon as the *Roma* had made a long trip or two it was planned to take up a small plane suspended by a cable carrying a large hook which was to have been passed through a large and strong ring fixed in the upper wing of the plane before leaving the ground. By means of a reel the plane was to have been hauled up against the rigid keel of the airship and held steady by small auxiliary braces, so that it would point directly ahead, parallel to the course followed and not whip about when the mother craft was under way.

The release of the plane when the carrier was under way was believed a simple problem. The pilot would get into his cockpit from the keel of the airship, start his engine and take the controls of his craft, then the plane would have been lowered slowly by a winch or reel, the pilot keeping the nose of his plane in the wind stream as he sped up his engines. When a safe distance below the big airship, the pull of his propellor keeping his suspension cable nearly vertical, he would signal to the handlers to let go. The catch on the hook would have been released, permitting him to fly off the hook, as it were, which would have been pointing ahead. Officers say that there might have been a slight drop as the plane took off, but if the pilot speeded up his engine gradually in excess of the airship's speed, his momentum and air speed would undoubtedly have taken him off the hook without any difficulty.

Picking Up a Plane in the Air

Picking up a plane in the air would have been a little more difficult it was expected, but if the airship lowered her hook pointing it aft, it was believed that with care a pilot could have flown his plane directly

onto the hook. He would have had to fly steadily at a trifle over the airship's speed, directly parallel to her course and exactly beneath her center, so that he could engage the large ring on his upper plane with the open hook on the trailing cable. Once caught on the hook which would have been closed immediately, he would have slowed his engine down as the cable was hauled up, and finally his plane would have been secured and braced against the keel of the mother ship, whereupon the pilot would have stopped his engine and climbed aboard.

With airplanes carried below big airships in this fashion it would be an easy matter to refuel them, supply bombs and machine gun ammunition and change pilots, enabling a weary air man to secure some rest without keeping the plane out of action, air service officers say.

Much remains to be carried out before the plan can be tried officially, but army officers are most enthusiastic about its possibilities although today the army is without an airship capable of carrying out the experiments, officers believe that a replacement ship will be secured for this purpose.—*Aviation*, 3 April, 1922.

NOTICE TO AVIATORS ISSUED BY HYDROGRAPHIC OFFICE, U. S. NAVY.—*Aircraft distress signals.*—Mariners and others are notified that when any aircraft is in distress and requires assistance, the following shall be the signals displayed by her, either together or separately:

I. The International Signal "S O S" by means of visual or wireless telegraphy.

II. The International Code Signal of Distress indicated by N C.

III. The Distant Signal, consisting of a square flag having above or below it a ball or anything resembling a ball.

IV. A continuous sounding with any sound apparatus.

V. A signal consisting of a succession of *white* Very's lights fired at short intervals.

VI. A *white* flare from which at intervals of about 3 seconds a *white* light is ejected into the air.

Note.—The above signals are subject to such modification as shall be published from time to time.—*N. A.*, 2 Febraury, 1922.

ENGINEERING

THE GAS TURBINE.—Outside of German engine builders apparently no engineering manufacturer has recognized the possibilities of the oil-gas turbine. While the cost of development work is high, still the organization that places a commercial gas turbine upon the market should find the returns ample to justify the outlay.

The oil-gas unit has shown an over-all thermal efficiency of 28 per cent. This represents a marked increase over the best steam-plant results. In addition, the labor charge should be largely reduced by the elimination of the boiler room. True, the gas turbine has been built only in comparatively small experimental units, but the experimental work has gone far toward eliminating the blade trouble that existed in the first machines.

At the present time a ten-thousand-kilowatt unit arranged to burn oil is being built in Germany. This machine is a decided advance over the first units, and there is every reason to expect that it will prove reliable. The blade temperatures, which have been the stumbling block, are kept within reasonable bounds by making the process of combustion intermittent instead of continuous. This reduces by about one-half the blade and wheel temperature. If this ten-thousand kilowatt machine proves successful, engineers may confidently look forward to the time when at least some of the larger stations as well as small plants will be equipped with gas turbines.—*Power*, 18 April, 1922.

DISTILLATION OF MIXTURES OF COAL AND OIL.—In the course of some experiments conducted by the United States bureau of mines in conjunction with the Trent Process Corporation, it was observed that mixtures of pulverised coal and heavy oils yielded a denser coke than the coal alone, and that even anthracite could be coked in this way. The bureau therefore resolved to investigate whether intimate mixtures of coal and oil would, on low-temperature carbonization, give more valuable products than could be obtained from the separate constituents. The problem—which is not altogether new—was also approached in the hope of producing a coke for domestic use in one operation from low-grade coal mixed with oil.

The report on this investigation, by J. D. Davis and C. E. Coleman, of the Pittsburgh Experiment Station, speaks of the intimate mixtures used as "amalgams"—not a term to be recommended. The amalgams were prepared by churning 12 kg. of non-coking coal, powdered to 200 mesh, with 12 litres of water and 5 kg. of a highly viscous, asphaltic Californian oil; the mixture, agglomerated to lumps of pea size, was drained and air-dried. The retort used for the carbonization at 600 deg. C., was a very heavy 6-in. iron pipe, wound with nichrome wire; the retort was charged with about 5 kg. of the material. In parallel tests ordinary mixtures and the separate materials were distilled. An interesting part of the apparatus was an electric high-tension precipitator for the tar mists; this precipitator consisted of a vertical glass tube, 1¼ in. or 2 in. in diameter, over 3 ft. high, wound outside with aluminium ribbon; the internal electrode, charged to 20,000 volts, was an axial copper wire. This small tube only operated satisfactorily as long as the rate of the gas flow through the tube did not exceed 0.1 cu. ft. per minute. The condensed vapours were distinguished as light oils or gasoline stock, boiling below 221 deg. C.; heavy oils or kerosené stock boiling between 221 deg. and 300 deg. C., and gases.

Considering our scanty knowledge of the real nature of coal carbonization it would have been inadvisable to predict the probable effect of distilling the intimate mixture upon the quantity and quality of the products. It was found that the mixure yielded more than twice as much gas, but only half as much tar as the constituents distilled separately. The amalgam gas was, however, by 43 B. Th. U., or 5 per cent, richer per cubic foot than the combined gases from the coal and oil, and thus the total heating value of the amalgam gas considerably exceeded that of the sum of the gases from the coal and oil. The additional gas came mainly from the oil. The coke amount obtained was increased by 18 per cent by mixing the constituents before distillation, and the coke, though not very firm, was denser than the coke from the coal alone. The yields of oils, gasoline stock and also kerosene stock, were decidedly lower. Light oils strongly predominated in the distillate; the original oil was probably absorbed by the coal and held in contact with it at temperatures far above its normal boiling point. The proportion of light oil might be raised by distilling at reduced pressure. The chief result of the combined distillation was an increase in the amount of gas obtainable. That will be an advantage under certain conditions. To draw an economic balance large-scale experiments would be required.—*Engineering*, 14 April, 1922.

WORK AHEAD FOR NAVAL ENGINEERS.—Instead of being the death knell of progress in the navy, the new treaty means, in the opinion of Admiral Robison, engineer-in-chief, that naval engineering will set new goals to achieve. It is the engineer who will take the most important part, he says, in improving the existing plant of the navy until it is comparable with new construction. Ships already old must be rejuvenated to the extent necessary to make them last as long as a new ship and make them capable of standing in the battle line as fit sisters with the few new ships that

may be constructed under the treaty. This is in no way inconsistent with the spirit of the agreement which provides for limitation rather than disarmament, and it is important that the units remaining be maintained in the most efficient state.

Improvements that would have been unwise under the old order will be made on vessels that would have been approaching retirement age. By the application of clever engineering Admiral Robison expects to see such ships brought to a high state of efficiency. This is especially true of their power plants. The reduced appropriations will mean, necessarily, that the navy's engineers be given every encouragement to exercise the fundamental function of all engineers—that of eliminating waste. Waste heat can be trapped, Diesel engines can be installed to furnish auxiliary electric power, lubricating oil can be purified before re-use, thereby cutting down the cost of bearing renewals, and greater use can be made of exhaust steam.

This is only a portion of Admiral Robinson's conception of the part the engineer is to play in the new navy. Force of circumstances will spur engineering endeavor to a point never before attained in that branch of the service, he believes.—*Power,* 11 April, 1922.

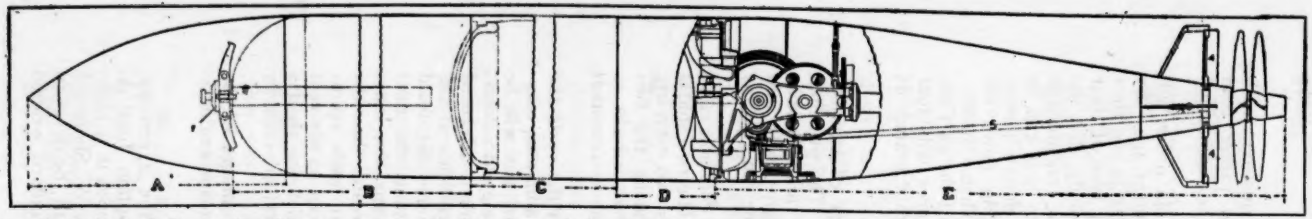
THE SPROULE INTERNAL-COMBUSTION ENGINE.—A new type of internal-combustion engine, the Sproule, has appeared in England. The principal drawbacks in present-day internal-combustion engines are limited flexibility and absence of overload capacity, low efficiency at light loads, and difficulty of reversing. That is, the internal-combustion engine can give the best results only at full speed.

In the design of this engine a pair of pistons work in a common combustion space, each piston operating a separate crankshaft. The two shafts are geared together at a 2 to 1 ratio, so that one piston makes two complete strokes while the other makes four. The method of gearing the two cranks is such that the relative angular setting of the two crankshafts in respect to each other can be varied at will, whether the engine is in motion or not.

When the two cranks are set so that at a given time in the cycle the two pistons are together at the back end of their strokes, the minimum compression space is available. In this case a small charge of gas will be compressed normally, but will be expanded to more than its original volume, giving an increased efficiency. If, now, the two-stroke crank is advanced relatively to the four-stroke crank, the two pistons cannot coincide at the back position, so that the minimum compression space becomes the fixed space plus a small portion of the two-stroke cylinder volume, the total giving the larger space necessary for a heavy load. The expansion ratio will now be less, but up to the normal full load it is still greater than the compression ratio and gives a high expansion efficiency at loads up to full load. The two-stroke crank can be advanced to give about 40 per cent more than the normal full-load charge, the expansion ratio being then a little lower than the compression ratio, so that a large overload capacity is provided with only a slight drop in efficiency.

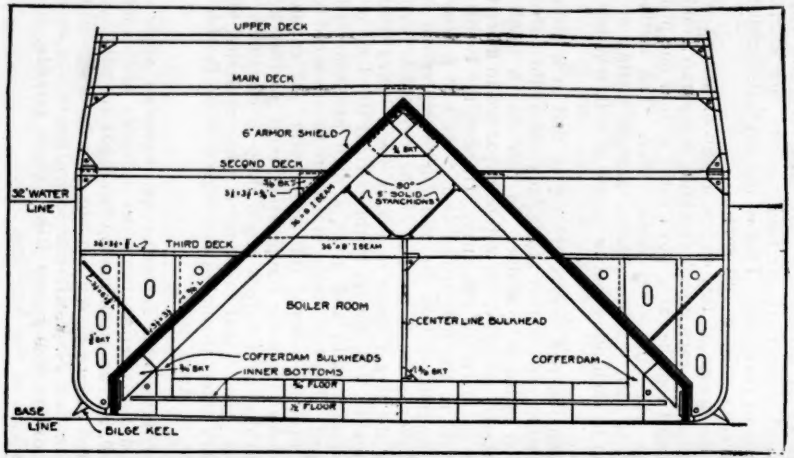
It is claimed that this engine, while retaining all the advantages of the ordinary internal-combustion engine, is as flexible as the steam engine.—*Power,* 11 April, 1922.

A FIFTY-KNOT TORPEDO.—An ingenious application of the gyroscopic method for steering torpedoes invented about 1884 by Captain John A. Howell, an American naval officer, has recently been introduced in a high-powered turbine-driven airplane torpedo designed by Mr. H. W. Shonnard of Montclair, N. J., who for several years was associated with the development of the well-known Bliss-Leavitt torpedo, now the standard weapon of its kind of the American navy.

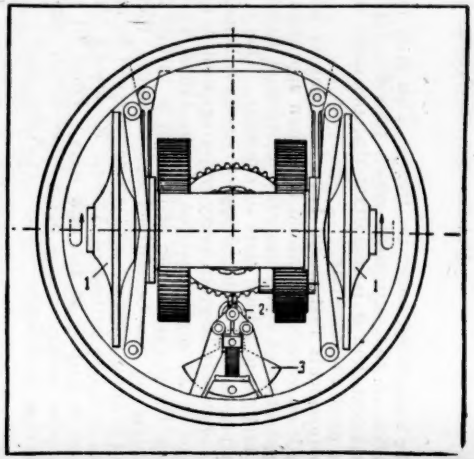


Section A, hollow collapsible speed cap. Section B, explosive charge compartment. Section C, compressed air container. Section D, fuel and water compartment. Section E, afterbody containing 500 h. p. gyroturbine power plant, as shown in section broken away, and the hydrostatic mechanism for controlling the depth of navigation.

FIG. 1. NEW 21-INCH GYROTURBINE WITH RADIUS OF 5,000 YARDS AT 50 KNOTS



INCLINED ARMOR FOR PROTECTION AGAINST SHELLS ABOVE, AND AGAINST TORPEDOES BELOW, THE WATERLINE



1, 1, The two 250 h. p. turbines. 2, The servomotor, controlled by 3, the pendulum to regulate the depth of the torpedo.

FIG. 2. CROSS SECTION AT THE GYROTURBINE POWER PLANT

Until Howell proposed the utilization of the gyroscopic force created by a spinning mass, and adapted such to practice by constructing a small torpedo fitted with a heavy fly-wheel having its axis in the horizontal plane athwartship, which fly-wheel when spun to a high rate of speed served the double purpose of furnishing gyroscopic force and also energy for propulsion, no reliable self-controlling means of steering torpedoes had been developed.

Under the plan devised by Howell, a lateral extraneous force that might tend to deflect the torpedo from its course, would cause the torpedo, through the gyroscopic action of the rotating fly-wheel, to roll slightly to port or starboard, according to the direction of said force, and bring into action a pendulum-controlled ratchet mechanism which operated a pair of vertical rudders. This means of steering was very effective and reliable. About 1888 the Whitehead Torpedo Works succeeded in applying a gyroscopic principle for steering in the form of a miniature removable unit, known, after its inventor, as the Obry steering gear. This device gave such control.

Throughout the subsequent evolution of the torpedo the excellent principle evolved by Howell has for many years apparently escaped the attention of inventors and engineers.

In the Howell method the elemental basis of control originates in the gyroscopic force of the torpedo's motive means, which, it will be remembered was a heavy fly-wheel in which necessity for delicate adjustment is eliminated, since any tendency of the torpedo to leave its course as a result of extraneous influence is automatically suppressed. On the other hand, in mechanism of the Obry type no automatic suppression or correction of gyroscopic precession is possible, the course of the torpedo being entirely dependent upon a miniature, delicately-mounted gyro-wheel remaining in the plane of rotation established at the time of launching the torpedo. Should it precess, and it usually does, and often to a considerable extent, proportionate deflection in the torpedo's course results.

Continual advancement in the speed and range of torpedoes and the height from which it becomes desirable to launch them, now that the airplane is available for the purpose, calls for gyroscopic mechanism of a rugged nature that is capable of continuous and closer control than is characteristic of Obry gear. The solution of these requirements is to be found in the method of Howell, and the designer has accordingly applied the same to his turbine-driven torpedo in the manner illustrated.

In Fig. 1 is shown the general arrangement of the Shonnard 50-knot airplane torpedo, wherein turbine rotors create the gyroscopic force necessary for steering under the Howell system. By referring to Fig. 2 which is a view of the turbine compartment looking aft, it will be noted that the two turbine rotors 1, 1, of the DeLaval type, which are geared to revolve at 22,000 revolutions per minute in like direction as is indicated by arrows, are mounted upon horizontal axes, one each side of the major, or longitudinal, axis of the torpedo, and a servo-motor, or air engine 2, controlled by a pendulum 3, is located below the turbine. This pendulum unit which is connected with the vertical rudders 4, 4, by the rod 5, Fig. 1, operates said rudders in response to the gyroscopic action of the turbine rotors, exactly as the pendulum arrangement of Howell operated rudders in response to the gyroscopic action of a fly-wheel.

The motive energy used to operate the turbines is superheated steam in combination with the products of combustion of alcohol burned in compressed air; which mixture enters the turbine nozzles at a pressure of 500 pounds per square inch and at a temperature of 1,500 degrees Fahrenheit.

FIG. 2. CROSS SECTION AT THE GYROTURBINE POWER PLANT

In combining the steering and motive elements in a single unit, a further advantage is secured in the saving of weight due to the elimination of the Obry gear mechanism which effects sufficient change in moment to permit of the installation of a power plant capable of developing 500 horsepower without disturbing the normal horizontal trim of the torpedo. In view of the probable limitation of warship construction, Mr. Shonnard's proposal becomes of particular interest, since it presages a notable advance in airplane torpedoing for coast defense.—*Scientific American*, May, 1922.

INTERNAL DIAGONAL ARMOR FOR WARSHIPS.—The diagram accompanying this article which shows the cross-section of a battleship, represents, by the two heavy black lines, a suggestion by one of our shipyard workers, Mr. C. H. Scheelky, for a method of armoring warships to meet attack by modern high-angle fire, by aerial bombs and by torpedoes.

In spite of its striking novelty and certain difficulties of interference with boiler and engine-room accommodations, the general idea is so much in keeping with the latest theories of warship armoring that we present it for consideration. The armor plan of ships built prior to the war calls for very heavy vertical armor, supplemented by light deck or horizontal armor. That was in the days when 10,000 yards was considered an extreme fighting range, and when shells fell upon a ship at an angle of 6 to 8 degrees. Today, the fighting will be at the extreme practical range, and the angle of fall will be from 18 to 25 degrees; which means that the greater part of the deck will be opened to direct attack. Hence the growth in favor of internal inclined armor.

The interesting point about the proposed method is that the design shows no vertical armor, and that the inclined armor is carried right down to the bilges. In answer to our question as to why this was done, Mr. Scheelky answers that torpedo attack has become so effective and deadly that it is necessary to keep the blast of explosion out of the engine and boiler rooms if the ship is not to be disabled.—*Scientific American*, May, 1922.

KITCHEN RUDDER FOR FERRIS WOODEN SHIP.—Plans have now been completed by The McNab Company of Bridgeport for the installation of the Kitchen reversing rudder on one of the Ferris type wooden ships which certain California shipping interests propose to convert into a Diesel engined vessel. A 1,400-h.p. Diesel engine of American make is being thought of. With the Kitchen reversing rudder fitted the engine would not have to be reversible. The operating gear could be of either the electric or hydraulic type. With this rudder it is claimed the vessel would have a maneuvering ability equal to that of the best Diesel electric driven ship. In addition the propelling machinery would be simplified to quite some extent and all transmission losses eliminated.—*Nautical Gazette*, 22 April, 1922.

ALLOY CASTINGS TO RESIST HIGH TEMPERATURE.—For the manufacture of retorts and other parts subjected to temperatures as high as 2,200 deg. Fah., the American General Electric Company has developed a new metal alloy known as "calite," which can be cast in the same way as iron and steel. The castings are adaptable for furnace parts, recuperators, heat exchangers, etc. Containers made of calite are used for carbonizing, case-hardening, annealing, and heat treating. Retorts, pots, boxes and other containers are used for melting Babbitt metal, copper, lead, and tin; for holding chemicals giving off corrosive fumes, and for other purposes in high-temperature work. The melting point of this metal alloy is 2,777 deg. Fah.; its softening temperature, 2,500 deg.; and its safe and maximum

working temperatures, 2,200 deg. and 2,370 deg. respectively. The specific heat 100 deg. to 15 deg. Cent is .123; thermal conductivity, 25 per cent that of iron; shrinkage from molten to cold condition, ¼ in. per foot. It has a specific gravity of 7.03, and weighs 0.25 lb. per cubic inch. In physical properties, calite has an elastic limit of 36,800 lb., a reduction of area (cast) of 2 to 3 per cent, and an elongation of 1 per cent. When annealed, it has a hardness of 286 by the Brinell method and 40 by the scleroscope. A bar 1 in. square supported on bearings 12 in. apart has a transverse test strength of 4,250 lb.—*The Engineer*, 14 April, 1922.

DEVICE AUTOMATICALLY SHUTS OFF FUEL OIL FROM BURNERS.—The increasing use of oil as fuel has led to the invention of many safety devices, one of the latest of these being the Todd Guardian which automatically shuts off the oil supply to the burners, when through any unforeseen condition the water has become dangerously low in the boiler.

The action of this device depends upon the water level in the boiler, which causes a bucket to fall. This movement sets a cradle in motion, permitting steam to escape to an oil-supply stop valve.

The device consists of a cast-iron body having two chambers. In one is a bucket float with anchor and chain suspensions to prevent the bucket from touching the sides of the chamber. The float is connected to a spindle. The steam connection is at the top and the water at the bottom. The bucket is always full of water, and it balances when four-fifths of its height is immersed in water.

When the water level falls in the boiler, it also drops in the float chamber, and the weight of water in the bucket will, at the danger level, produce by its weight a strong downward pull on the spindle and cause the cradle to tip, whereupon a ball falls out and strikes the ram head on top of a cartridge. The ram has a peculiar shaped point which perforates a copper disc and allows steam to escape through the opening thus made. This steam enters a stop valve above the diaphragm, which automatically shuts off oil fuel supply to burners.

As the cartridge is a complete unit, it is easily inserted, but not until the ball has been pushed back into the cradle by means of a rod.—*Nautical Gazette*, 29 April, 1922.

DIEL-MORE VALVE DRAINS CYLINDERS AUTOMATICALLY.—A relief valve for use with all kinds of reciprocating steam equipment, which automatically drains the cylinder when the throttle is closed, is shown in Fig. 1. The object of the device is to make it unnecessary for the engineer to bother with opening and closing the cylinder drain valves and to make for greater safety.

The drain pipes from the two ends of the cylinder are brought down just below the cylinder and connected to the valve body at both sides, as shown in Fig. 1. There being no valves in these pipes, the full steam pressure carried in the engine cylinder is let into the valve chamber, tending to lift the valve disc. However, the disc will not be raised by this pressure if the engine throttle is open, because the full steam pressure at the throttle is holding it down. This full steam pressure is let in through the top opening, to which a pipe from the steam chest is connected. The pressure in the steam chest is, of course, a little greater than that in the engine cylinder, and so the valve stays closed while the engine is running.

When the throttle is closed and the engine is stopped, however, the valve disc no longer has more than atmospheric pressure above it, and so is raised by the spring beneath it. This leaves a free passageway from the two ends of the cylinder into the drain pipe, so that water runs out of the cylinder as fast as it condenses. When the throttle is opened later to

start the engine again, the cylinder is already free of condensation, and the drain valve is closed by the steam pressure in the valve chest.

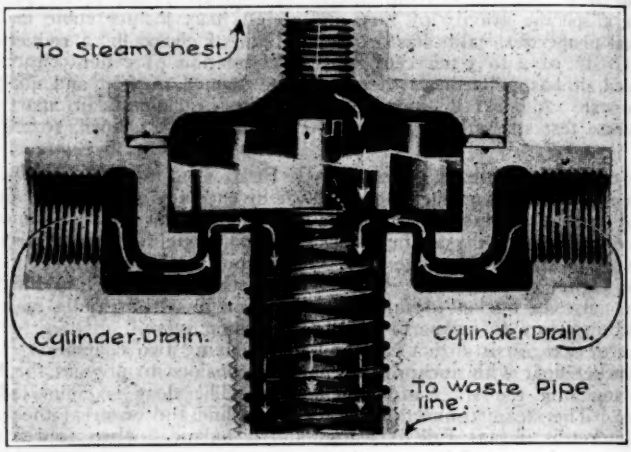


FIG. 1. AN AUTOMATIC CYLINDER DRAIN AND RELIEF VALVE

With the engine running, full throttle pressure holds the disc down against the cylinder pressure under it; with the throttle closed and the engine idle, the spring raises the valve disc, draining the cylinder. Any water that enters the cylinder while the engine is running forces the valve open and escapes.

The top of the valve disc is so shaped as to give a sort of turbine action, the pressure of the steam tending to turn it. Since it is connected with its spring by a joint that leaves it free to turn, it is given a slight twist every time it is closed, and so may be said to be self-grinding. On the circumference of the disk are eight shallow grooves, as shown in Fig. 1, so that condensation from the steam chest can escape into the main drain, together with that from the cylinder itself.

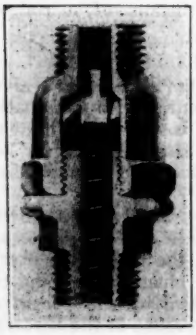


FIG. 2. WHISTLE DRAIN

The spring that holds the valve disk off its seat may be easily adjusted for tension by screwing it in or out, a helical groove being cut on the inside of the pipe to correspond with the turns of the spring. The device may act not only as a drain valve, but also as a relief valve, in this way: If water comes into the cylinder while the engine is running, the piston will force it through the drain pipe into the relief valve and up against the bottom of the valve disk; as the pressure under the disk will then be temporarily greater than over it, the disk will rise and let the water out. Of course, a large slug of water would scarcely pass throught the small drain pipe fast enough to avoid wrecking the engine, but a certain amount of water could doubtless be handled by the valve in this way, and so partly, at least, protect the engine.

Another use of the device is with direct-connected engines, as locomotives. In such cases, when the engine is idling the valve disk is kept

off its seat by the spring, there being no pressure over it, and hot air is drawn back and forth between the two ends of the cylinder. This avoids warping of the cylinder, which is otherwise likely to be caused by the cold drafts of air that are drawn in at every stroke through the usual type of drain cock.

By the addition of two extra drain inlets in the valve body, making four in all, the valve is made suitable for use on duplex pumps.

The smaller valve in Fig. 2 works on much the same principle, and is applied to whistles and similar devices that may give trouble with condensation. The spring holds the valve open until steam is turned on, when the pressure closes it.—*Power*, 4 April, 1922.

NAVIGATION AND RADIO

CONSOLIDATED SHIPBUILDING CORPORATION TURNS OUT LARGEST LIGHT VESSEL IN THE WORLD FOR DIAMOND SHOAL STATION.—The Consolidated Shipbuilding Corporation of Morris Heights, New York City, has just completed and delivered to the light house department, Washington, two 160-foot light house tenders named the *Oak* and *Hawthorne*, and one 147-foot lightship named the *Diamond*. These vessels have been under construction at the Consolidated yards for the past year and have been built to specifications of the United States government.

The tenders are constructed of steel with a continuous main deck, a raised forecastle deck, a main deckhouse and partial upper deck, and upper deckhouse aft. The steam generating plant consists of one Scotch type boiler using bituminous coal for fuel. The main propelling engine consists of one vertical triple expansion engine, surface condensing, driving a single screw, and developing 700 indicated horsepower.

The new lightship *Diamond* is the largest light vessel in the world and will be stationed off Cape Hatteras on the dangerous outer Diamond Shoal, one of the most treacherous and exposed points on the Atlantic coast. The vessel is to replace the former light vessel *No. 72* which was sunk by a German submarine in August, 1918, while occupying this station.

She is 147 feet long overall, has a beam of 30 feet, and a displacement of 825 tons. She is of the self-propelled type, single screw, driven by a fore and aft compound engine with cylinder diameters 16″ and 31″ and a common stroke of 24″. Steam will be supplied by two Scotch boilers using oil as fuel.

Description of Lights

The vessel will show a flashing light from a 375 m.m. lens lantern at the foremast head, the illuminant being acetylene gas, controlled by an electric flasher operating the gas burners, and giving the light a characteristic distinguishing it from other lights on the neighboring coast. This apparatus will be in duplicate, with a lantern on each of the two mastheads, so that in case of accident the other light may be used.

This vessel will be equipped with three distinct fog signals, a steam chime whistle, a submarine bell, and an automatic radio fog signal, thus using three different mediums for sending warnings to the mariner of danger in fog. The *Diamond* will be the first lightship of the lighthouse service to be equipped on construction with the radio fog signal.

The crew are provided with comfortable quarters and modern conveniences, including a refrigerating plant.—*Nautical Gazette*, 22 April, 1922.

MODERN DEEP SEA SOUNDER.—Among the crew of the new White Star-Dominion liner *Regina* is P. S. Hudson, who has invented a modern deep sea sounder, meant to supersede the ancient lead and to give authentic samples of ocean bottoms. Mr. Hudson states that his invention has

been adopted by the British admiralty and accepted by the board of trade.

The Hudson sounder is approximately four feet long, and weighs about thirty-four pounds. It has been designed to meet the demands of immediate service, and to withstand the severest conditions of usage. The sinking weight is usually of cast iron, slung on a stout steel bar, and welded to ensure perfect rigidity. The cap is entirely of gun metal, and contains a small filter bag, to which the matter entering the cup is carried, and the salt water passing through the filter allows the solid constituents to remain in the filter bag.

The filter is made accessible by means of a screwed gun metal nose piece, perforated to permit the expulsion of salt water. This arrangement provides that the sample taken shall be comparatively pure, and as far as practicable free from salt water, and so collects the solid matter, thus giving excellent results.—*Nautical Gazette*, 15 April, 1922.

TO DREDGE BERMUDA CHANNEL.—Lloyd B. Sanderson of Sanderson and Son, New York agents of the R. M. S. P., announces that the Bermuda development board will soon begin dredging and blasting operations in Dundonald Channel, the sea entrance to Great Sound, twelve miles from Hamilton and on two rocky passages near Hamilton. The work will be completed by fall. Twenty-five to twenty-six feet at low water will be provided in the channels, so that big liners can dock at Hamilton instead of anchoring in Grassy Bay and landing their passengers by tender.—*Nautical Gazette*, 22 April, 1922.

ONE-WAY ROUTES FOR PACIFIC.—In order to reduce the risk of collision at sea the hydrographic office of the navy department has taken definite steps towards double tracking the North Pacific Ocean. Co-operation of the Japanese, Canadian and British naval and steamship authorities has been sought, and data is accumulating on which a decision finally will be made, possibly in the near future. The project contemplates mapping out the most favorable courses from Nort Pacific ports on this side to Japan and return, westbound and eastbound traffic following prescribed routes well separated from each other.—*Nautical Gazette*, 15 April, 1922.

MEASUREMENT OF OCEAN DEPTHS.—A new device just developed by the navy department and which makes possible the accurate measurement of any depth of the ocean possibly will result, hydrographers say, in the charting of spots in the sea which have never been measured because their depth was too great for the old method of sea sounding work.

The new device is said to employ sound apparatus similar to that used during the war for the detection of submarines. The principle of its use is that of creating a sound on the ship and listening for the echo of this sound from the bottom of the ocean, measuring the time between the creation of the sound and the return of the echo.—*Nautical Gazette*, 22 April, 1922.

RADIO COMPASS USE.—The radio compass is rapidly coming into use on the Great Lake fleets. The United States navy has sold from its surplus stock many complete installations and with the aid of the three navy radio compass stations located at the so-called "graveyards" of the lake at Whitefish Point, Detour Point, and Grand Marais cross bearing may be obtained at any time. The radio compass has proved of special value in case of fog and snow in determining the relative position of the ships and ship owners are enabled to keep in direct communication with the vessels through the navy radio relay service.—*Tech. Engineering News*, May, 1922.

RADIO BEACONS CAN BE MADE TO OPERATE AUTOMATICALLY.—Radio beacons, which are radio transmitting stations intended primarily for direction finding work, can be installed at small expense on lighthouses and light vessels. The transmitting equipment may be designed to operate automatically by simply throwing a switch, so that no additional personnel is necessary. The radio transmitting equipment is set into operation by the lightkeeper, just as the other signaling devices at the light station. The expense of operating the radio beacon is therefore small.

The department of commerce has established three radio beacons at the approaches to New York harbor, on Ambrose Lightvessel, Fire Island Lightvessel and at Sea Girt Lighthouse, Sea Girt, N. J. These three beacons are now in regular commission and transmit waves of a frequency of 300 kilocycles per second (wave length=1,000 meters). A radio beacon is being installed on San Francisco Lightvessel *No. 70*. These becons have automatic transmitting equipment so that no operator is necessary.—*Nautical Gazette*, 22 April, 1922.

RADIO ON MAIL PLANES.—One of the big air mail ships came over from Chicago to Washington April 15 in the flying time of 6 hours and 2 minutes, piloted by E. Hamilton Lee. The mileage was 715 miles, which averaged 119 miles per hour. This ship came here for the purpose of having installed as a part of its equipment the radio sending and receiving telephones. This is the first of the transcontinental ships to be equipped with this wireless telephone outfit. It is expected to equip all of the air mail ships with these instruments. The radius is 200 miles. With this wireless telephone equipment attached to the airships the pilot will be in constant touch with the station just left and the one to which he is flying. There will also be a range finder to locate the station toward which he is flying during foggy and stormy weather.—*Aerial Age Weekly*, 24 April, 1922.

ORDNANCE

MANUFACTURE AND PROPERTIES OF STEEL PLATES CONTAINING ZIRCONIUM AND OTHER ELEMENTS. [ABSTRACT.]—This investigation originated from the need of the ordnance departments of the army and navy for information regarding the effects on the ballistic properties of light armor plate of certain chemical elements such as zirconium.

A joint program was outlined according to which the bureau of mines was to produce and analyze ingots of the desired compositions; the bureau of standards to manufacture and heat-treat plates, carry out physical tests, micro-examinations and chemical analyses, and develop methods of chemical analysis, when needed, for the more unusual elements in steel and in the presence of each other; and the navy department was to carry out the ballistic tests.

Although the results of the ballistic tests are not available for publication, an account of the mechanical properties and tests of this series of somewhat unusual steels was considered worthy of publication. These results may be summarized as follows:

About 193 heats of steel containing in various combinations the following principal variable elements: carbon, silicon, nickel, aluminum, titanium, zirconium, cerium, boron, copper, cobalt, uranium, molybdenum, chromium, and tungsten, have been studied.

None of the steels presented any difficulties in rolling into plate except those containing boron.

The usual mechanical properties and impart tests were carried out on all of the steels. It is shown that steel containing 0.40 to 0.50 per cent carbon, 1.00 to 1.50 per cent silicon, 3.00 to 3.25 per cent nickel, and 0.60

to 0.80 manganese and deoxidized with a simple deoxidizer such as aluminum can be produced having a tensile strength of approximately 300,000 pounds to the square inch, with excellent ductility and toughness. This type of steel is recommended for a structural material.

Although the same high properties are obtained in steels of the above composition with the aid of additional elements it does not appear necessary to resort to such additions of expensive alloying elements.

Zirconium, like titanium and aluminum, acts primarily as a scavenger, and when it is not removed as part of the slag remains in the steel in the forms of square bright yellow inclusions not directly visible at magnifications lower than 500 x. It is not considered that these inclusions can be very beneficial, and if they are segregated and rolled out into thin plate-like streaks they may be detrimental, especially in armor plate.—*U. S. Standard Bureau of Notes,* April, 1922.

SHRINKAGE OF 4.7-INCH GUN MODEL 1920 MI.—The assembly of 4.7-inch gun Model 1920 MI. presented a difficult problem to accomplish the assembly of the jacket. The difficulty is due to the fact that the jacket is of unusual length in proportion to the diameter of its bore; the thickness of wall is also relatively thin which fact makes the radiating surface unusually great as compared to the weight of metal. Added to the unusual proportions of the jacket the fact that the jacket has to be shrunk over a wire-wound surface for almost its entire length introduces another difficulty; it being more difficult to refrigerate the gun proper and contract the outer diameter of the wire-wound surface.

The difficulty in refrigerating is due to the fact that the lack of continuity of the metal between the tube and the different layers of wire forms zones which retard and make less effective the passage of the cooling water through the bore of the gun with the result that the heated jacket causes the wire-wound surface to expand and come in contact with the jacket before the jacket is assembled to its proper position.

The total length of the finished jacket is about 163 inches; the diameter of the bore at the muzzle end being 7.2 inches. The bore of the jacket is composed of four (4) cylindrical zones—the longest being 102 inches in length. The total length of the gun tube is 225 inches. This tube is wrapped with a series of layers of wire 1/10-inch square extending from a point 2½ inches forward of the breech end for a distance of approximately 142 inches.

A shoulder formed by a collar threaded on the breech end of the tube 1.5 inch. from the end provides a seat for a corresponding shoulder at the breech end of the jacket. The assembly of the jacket against the shoulder formed by this collar locks the tube to the jacket and assists in preventing a longitudinal movement of the tube forward in the jacket.

It is very important that it be made certain that the shoulder is in contact as any longitudinal movements of the tube would result in gas leakage due to faulty obturation. After the tube had been wire-wound the surface was turned smooth to the diameter of the bore of the jacket plus the prescribed shrinkage; care being taken to make the bore of the jacket of such size that the proper diameter of the wire-wound surface would result with the removal of very little metal from the last layer of wire.

A plug carrying two (2) water connections—one an inlet and the other an overflow or outlet was assembled into the breech end of the tube. Before the tube was assembled into the heated jacket it was lowered into the shrink pit muzzle end up and water connection made to the inlet plug at the bottom. The overflow pipe which is assembled in the interior of the tube extends from the plug upward to a point slightly above the surface corresponding to the muzzle end of the jacket when assembled. Water

was then turned on until it just discharged through the overflow pipe. This arrangement was necessary to permit a continuous flow of cold water in the interior of the tube and to delay the absorption of heat by the tube from the jacket so as to maintain as much difference in temperature between the tube and the jacket as possible as it was expected that the tube with the wire-wound surface would rapidly extract heat from the jacket and cause the jacket to grip the tube before assembled to proper position.

As previously stated it is absolutely essential to maintain shoulder contact at the breech end of the jacket and tube. To accomplish this it is necessary that the jacket be made to grip the tube first at the breech end so that when longitudinal contraction takes place in cooling, the slippage of the jacket due to contraction should all be from the muzzle and towards the breech end of the jacket which should be held stationary.

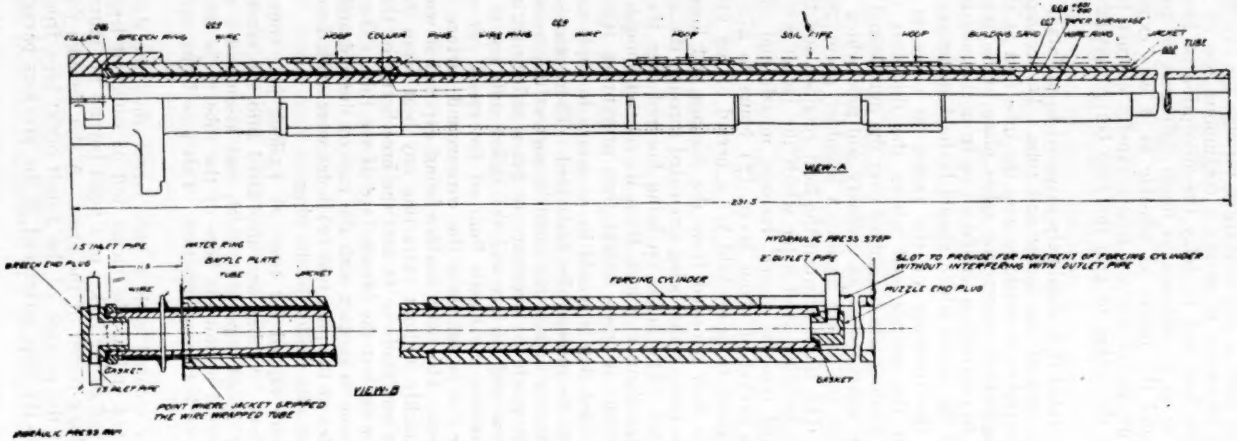
To eliminate the tendency of the jacket to come in contact with the tube first at the muzzle end where the thickness of wall is a minimum, a heat retainer was assembled over the muzzle end of the jacket. This heat retainer consisted of an ordinary soil pipe which was slid over the muzzle end of the jacket against a shoulder about 76 inches from the muzzle end. The space between the heat retainer and the jacket was filled with coarse building sand after which the jacket with its heat retainer was lowered into the elecric furnace, muzzle end up, and heated slowly through a period of about seven (7) hours to a temperature of 750° F., this temperature being held for a period of ten (10) hours.

The jacket was then removed from the furnace and lowered over the muzzle end of the tube; water being circulated through the tube constantly as previously stated. The jacket on being lowered over the tube gripped the tube at a point about 11.6 inch from its contact shoulder, gripping it sufficiently to support its own weight thus preventing further assembly.

It was now decided that it would be necessary to apply pressure to the jacket if it was to be successfully assembled. There was some question, however, as to whether or not this could be successfully accomplished, due to the fact that it would be necessary to get a difference in temperature between the wire-wound surface and the jacket sufficient to move it at a pressure not exceeding the elastic limit of the metal. It would also be necessary to slide the jacket along the wire-wound surface at the muzzle end for 11.5 inches. This wire surface being exposed it would be necessary to cool it quickly without extracting any heat from the end of the jacket. The plug was made to fit into the breech end of the tube having a shoulder to bear against the breech face of the tube. The outer end of the plug would come in contact with the ram of the hydraulic press. Into the projecting sides of the plug two (2) holes were drilled connecting with a longitudinal hole also drilled in the plug.

These holes were tapped for two (2) 1.5-inch pipe connections to be used as water inlets. A plug was also fitted into the muzzle end which was tapped for a 2-inch pipe into which was assembled a pipe rising to a height which would permit the bore of the tube to be filled completely with water when in horizontal position. This pipe being used as a water outlet.

A forging was secured with a bore larger than the diameter of the tube at the forward end of the jacket and of sufficient length to extend from the muzzle end of the jacket to a point beyond the muzzle end of the tube to take the back thrust of the press. A slot through the side of this forging permitted the passage of the 2-inch outlet pipe from the plug in the muzzle end of the tube mentioned in the previous paragraph.



JACKET ASSEMBLY, 4.7-INCH GUN, MODEL 1920-M1

A baffle plate of thin sheet metal circular in form the same diameter as the wire-wound surface was assembled at the breech end of the jacket in order to permit the free application of water on the protruding wire surface without having it come in contact with the breech end of the jacket. When these preparations were completed the gun was placed in the electric furnace and heated as previously described to a temperature of 750° F. The gun was then removed from the furnace and placed in the horizontal hydraulic press; the plugs with their water connections were assembled and water connections were made to two (2) 1.5-inch inlets and the ram of the hydraulic press brought up against the plug at the breech end of the tube; a pressure of twenty (20) tons being applied. This pressure was applied to hold the plugs against their shoulders and to prevent the escape of any circulating water.

It is necessary that the lapse of time from the removal of the gun from the furnace to the hydraulic press be as short as possible as there is a large amount of radiating surface and the temperature drops rapidly. Therefore it is necessary to have all arrangement completed to the minutest detail.

The gun was removed from the furnace at 9:35 A. M. It was in position in the press at 9:40 A. M.; the pressure of twenty (20) tons being applied at 9:41 A. M. and water circulated through the tube one-half (½) minute later. As soon as the water was turned into the tube the pressure on the press was increased to forty (40) tons and at 9:42½ A. M. the tube started to move into the jacket which means that after water circulation had been obtained for one (1) minute the temperature between the jacket and the tube was of sufficient difference to contract the diameter of the tube sufficiently to nearly break contact. The approximate difference in temperature necessary to accompish this result is 100° F.

In forcing the jacket onto its contact shoulder it was necessary that the pressure used be limited to that value which would not exceed the elastic limit of the metal. It was also necessary to continually measure the position of the jacket in order to quickly reduce the pressure when the jacket reached the contact shoulder as the cross section of the metal at this point made necessary a reduction in pressure in order not to exceed the elastic limit of the metal at this point to which the stress would now be transferred. The jacket was in contact with the shoulder at 9:49¼ A. M. As the shoulder came in contact the circulating water was discontinued and the pressure in the hydraulic press held to one hundred and fifty (150) tons in order to maintain shoulder contact, as the tendency in cooling would be to pull away from the shoulder. At 9:50 A. M. the pressure was reduced from one hundred and fifty (150) tons to one hundred (100) tons. The jacket was observed to move slightly off shoulder. The pressure was again raised to one hundred and fifty (150) tons bringing the shoulders again in contact. This pressure was held until 11:30 A.M. at which time the temperature of the jacket and tube was so nearly uniform as to preclude any tendency to change their relative positions.—*Army Ordnance*, March-April, 1922.

MISCELLANEOUS

RUSSIAN NOTES.—News of the Rusian navy comes through at rare intervals, and even then is not always reliable. It transpires, however, that the Soviet government has lately been exhibiting more than its ordinary interest in naval affairs, and has just issued a peremptory order to the Baltic fleet command, insisting on the maintenance of stricter discipline and a higher standard of efficiency. It remains to be seen whether this order will have any effect. All the evidence points to the navy as being in a state of hopeless disorganization. Training has been almost entirely in abeyance during the last few years, the few capable officers and skilled

technicians who survived the Bolshevik revolution having since left the service, and the remaining personnel are said to be more or less ignorant of the rudiments of their profession. As these reports are largely based on hearsay evidence, they may be misleading, though, in view of the long period which has elapsed since any Russian warship was seen at sea, there can be little doubt that the fleet has greatly deteriorated both in personnel and material.

The dreadnought battleship *Petropavlovsk* and *Sevastopol* have been renamed *Parishskaya Kommuna (Paris Commune)* and *Marat* respectively, and some of the smaller vessels are also said to have new names. The *Petropavlovsk,* it will be recalled, was torpedoed in Kronstadt Harbour by a British c. m. b. in 1919, but having sunk in shallow water on an even keel, she was raised without much difficulty. In March last year both this vessel and the *Sevastopol* were reported to have been "blown up" at Kronstadt by revolutionaries of Colonel Koslovski's party, but as, according to all accounts, both are still in service the damage cannot have been very severe. An interesting feature of these ships and the other two of the class is that they are armed with 12-in. guns of 52 calibres, the longest main battery guns at present mounted in any capital ship. The Baltic fleet is credited with a present strength of 60 destroyers, including 22 large boats of 1,260 to 1,610 tons, and about 20 submarines, several of which are minelayers, carrying 42 mines each. This, however, is a paper estimate which is probably far in excess of the effective establishment.—*Naval and Military Record,* 5 April, 1922.

ARGENTINE NOTES.—According to reports published in Berlin, the Argentine government has adopted a submarine programme, and a number of boats have already been laid down at Bahia Blanca under the supervision of German engineers. The building material is to be imported from Germany and apparently the engines as well, though it is not easy to see how this can be done without violating the provisions of the peace treaty. The submarines are to be modelled on a design that was constructing in Germany at the armistice. Their displacement will be 820 tons on the surface and 1,010 tons submerged, the speed 15½ knots above and 8 knots below, and the armament two 4.1-in. guns and six tubes. The Argentine navy has not hitherto possessed any submarines, but both Brazil and Chile have a few in service.—*Naval and Military Record,* 5 April, 1922.

RED FLEET TO BE ON WAR FOOTING.—The Soviet government has issued a decree ordering the fleet to be put on a war footing immediately. The Baltic fleet consists of two dreadnoughts, two cruisers, and torpedo boats, and submarines in comparatively good condition. The Caspain fleet is in poor condition, and the Black Sea fleet has disappeared. Personnel is reported at 48,000, but it is believed to be only 30,000.—*Naval and Military Record,* 19 April, 1922.

GYROSCOPIC STABILIZER TEST SUCCESSFUL.—A very successful test of the gyroscopic stabilizer that has been built for the Shipping Board's passenger steamer *Huron* by the Westinghouse Electric and Manufacturing Company was made last week at the South Philadelphia Works. But for a few incidental adjustments, the stabilizer is practically ready for installation in the ship now. The contract for the stabilizer was secured by the Sperry Gyroscope Company direct from the Shipping Board and it was built from Sperry designs by the Westinghouse Company.—*Nautical Gazette,* 15 April, 1922.

CHANGES IN GEOGRAPHICAL POSITION.—Cambridge has moved twenty-six feet away from Greenwich in the period of forty years according to

Professor J. W. Evans, scientific advisor to the colonial office. This unseemly conduct has not been confined to Cambridge, but Professor Evans states also that Greenwich, supposedly the stable center of time, has moved half a mile toward the equator in a period of eighteen years and also that Naples has moved a mile and a half in the same direction in a period of fifty-one years. Professor Evans also believes he has discovered the causes of the rise and fall of the earth's surface amounting to about eighteen inches, in response to the force of attraction of the sun and moon on the earth. The English scientist believes these phenomena are due to the effect of the sun's heat on the deserts south of Europe—the Sahara for instance. The intense heat generated there causes expansion of the surface and sufficient to lift the entire surface a distance that can be detected by delicate instruments.—*Tech Engineering News,* May, 1922.

CURRENT NAVAL AND PROFESSONAL PAPERS

"Naval Policy and Naval Training"—*North American Review,* May, 1922.

"Merchant Commerce and World Shipping in Relation to Sea Power"—*Engineering,* 7 April, 1922.

"Deep Water Quays"—*Engineering,* 31 March, 1922.

"Longitudinal Strength of Cargo Vessels and Its Variation with Fulness of Form"—*Engineering,* 21 April, 1922.

"Recent Developments in Motor Lifeboats"—*Engineering,* 21 April, 1922.

"Application of Electric Motors"—*Power,* 18 April, 1922.

"Recent Developments in Gas and Oil Turbines"—*Power,* 2 May, 1922.

"Surveying from the Air"—*Journal of the Franklin Institute,* April, 1922.

"Long Distance Radio Communication"—*Journal of the Franklin Institute,* April, 1922.

"Recent Types of Hydraulic Transmission Gear"—*Industrial Management,* 6 April, 1922.

"Taking the Riddle out of Radio"—*Scientific American,* May, 1922.

"Cutting and Fitting Beneath the Waves"—*Scientific American,* May, 1922.

"The Industrial Production of Helium.—*Scientific American,* May, 1922.

NOTES ON INTERNATIONAL AFFAIRS

FROM APRIL 5 TO MAY 5

PREPARED BY

ALLAN WESTCOTT, Professor, U. S. Naval Academy

WORK OF GENOA CONFERENCE

CONFERENCE ORGANIZED.—The Genoa Economic Conference opened on April 10, with Premier Facta of Italy as presiding officer. Each of the Allied powers was allowed five official delegates, and the same number was allowed to Germany and Russia, other nations of Europe being allotted two each. All the nations of Europe were represented, and also Japan. At the opening session, upon a reference by the Russian delegate, M. Tchitcherin, to Russia's willingness to consider reduction of armaments, the French delegate, M. Barthou, made a strong protest against the inclusion of this or any other subject not permitted by the Cannes resolutions under which the conference was created. The difficulty was smoothed over by the efforts of Mr. Lloyd George, which drew from M. Tchitcherin a promise to keep to the official agenda.

Against French opposition, both Germany and Russia were given representation on the principal committee, which had to do with the practical application of the Cannes resolutions providing for non-interference in internal affairs, assurance of property rights in nations aided, and recognition of debts. On this main committee, in addition to the delegates of the chief powers, representation was also accorded to four of the smaller powers—Poland, Roumania, Sweden, and Switzerland. Four other commissions were similarly organized to deal with Russia, Finances, Economics, and Transport; and these at once took up the recommendations submitted by experts.

NEGOTIATIONS WITH RUSSIA.—Throughout the earlier stages of the conference the Russian problem was uppermost. In the beginning, after securing admission of the principle of reciprocity in claims for damages, and after admitting Allied claims amounting to sixty-five billion gold francs, Russia put in a fantastic counterclaim of one hundred and twenty-five billion gold francs against the Allies. This she offered to settle on payment by the Allies of two billion francs, with promise of a loan. Russia further offered to cut her army of 1,450,000 (in reality about 600,000) in half if other nations would do the same. After rejecting these proposals,

the delegates of the convening powers set down as conditions to further negotiations that Russia must:

First—Recognize the pre-war debt of Russia.

Second—Recognize the responsibility of the Russian government for the sums borrowed by Russia from the Allies during the war.

Third—Recognize the liability of the Soviet government for property owned by foreigners which the Soviet had nationalized.

That done, Mr. Lloyd George told M. Tchitcherin the Allied powers would consent to receive and consider the Russians' claims against the Allies for the support given to the efforts of Deniken, Kolchak and Wrangel.

RUSSO-GERMAN COMPACT.—On April 16, evidently worried by informal discussions going on between Russia and the Allied powers, Germany signed a sweeping agreement with Russia. By the terms of this agreement, (1) the two nations mutually agreed to cancel claims for war damages of all kinds, including civil claims based on the effects of war measures, and also expenses of prisoners of war, (2) Germany renounced both public and private claims for damages as a result of post-bellum measures taken by the Soviet government, with the important provision that the Soviet government should not satisfy similar claims made by any other state; (3) resumption of diplomatic relations was agreed upon; (4) both governments agreed to regulate their commercial relations on "the most favored nation" principle; (5) both governments agreed to mutual assistance in economic difficulties, and to hold a preliminary exchange of views before entering into an international general settlement..

Following out this agreement, it was announced on April 27 that diplomatic relations between Germany and Russia had been resumed, Professor A. Bernhard Wiedenfeld representing Germany at Petrograd and Leonid Krassin going to Berlin.

CONFERENCE CONDEMNS GERMAN ACTION.—Upon news of the Russo-German treaty, representatives of the Big and Little Entente and Portugal signed on April 23 the following letter to the German delegates condemning the separate action of Russia and Germany as "contrary to the spirit of loyal co-operation essential to the restoration of Europe," and excluding Germany from further participation in discussion of matters relating to Russia.

"The undersigned desire to acknowledge the receipt of your reply to their note of April 18, indicating the attitude that they felt bound to adopt in view of the treaty concluded by the German and Russian delegations.

"They note with satisfaction that the German delegation realizes the conclusion of a separate treaty with Russia on matters falling within the purview of this conference renders it undesirable that that delegation should participate in the future in the discussion of the conditions of an agreement between Russia and the various countries represented in the conference.

"The undersigned would have preferred to refrain from further correspondence on the subject. There are, however, certain statements in your letter which they feel it their duty to correct.

"Your letter suggests that the German delegation has been forced to conclude a separate agreement with Russia by the refusal of the members of the delegation of the inviting powers to consider grievous difficulties which the proposals formulated by their experts in London would have created for Germany.

"The undersigned representatives of the inviting powers have made inquiries of the members of their respective delegations and find no shadow of justification for this statement. On various occasions members of the German delegation have met and talked with members of the delegations of the inviting powers; but never has it been suggested that the London proposals afforded no basis for discussion in the conference, and that the German delegation was about to conclude a separate treaty with Russia.

"The allegation that the informal discussions with the Russians on the subject of recognition of debts exposed the delegation to the risk of being confronted with a scheme unacceptable to Germany but already approved by a majority of the members of the commission, is equally unfounded. No scheme would, or could, have been accepted by the conference without the fullest opportunity for discusssion in competent committees and subcommittees; and in these Germany was represented on a footing of equality with the other powers.

"A misconception of the scope of the experts' proposals or a misunderstanding of the informal conversations with the Russians might well have justified a request for full discussion in the committees of the conference. They can provide no justification for the action which now has been taken, and the undersigned can only regret that your note should have attempted in this way to impose on the other powers the responsibility for a proceeding so contrary to the spirit of loyal co-operation which is essential to the restoration of Europe.

"The undersigned expressly reserve for their governments the right to declare null and void any clauses in the Russo-German treaty which may be recognized as contrary to existing treaties. The incident may now be regarded as closed.

"Please accept, Mr. President, the assurance of our high consideration."

The note is signed by the representatives of the Big and Little Entente and Portugal.

RUSSIA INSISTS ON LOAN AND RECOGNITION.—On April 21 the Russian delegates made a formal reply to the proposals of the creditor Allied governments. Briefly, the Allied terms were: (1) refusal to admit Soviet claims; (2) a promise to scale down the Russian war debt; (3) insistence upon recognition by the Russian government (a) of debts due foreign nationals, and (b) of the right of such nationals to secure their property rights in Russia or get damages for the loss thereof. The Russian reply accepted these terms with the exception of the matter of property rights, in which matter Russia wished to reserve the right of holding the property and paying therefor. Russia also insisted on a foreign loan and official recognition.

PROPERTY TERMS CAUSE DIFFICULTY.—As later presented to Russia on May 3, the Allied terms made no mention of a loan and did not release Russia from her war debt. The property clause in these proposals caused great difficulty among the Allied powers, both France and Belgium refusing to sign the draft as finally presented.

Genoa, May 3 (Associated Press).—The complete text of the private property clause which has caused so much controversy is available now. It emphasizes that Soviet Russia has a perfect right to organize such property administration as she wishes, but must return or restore the private property of foreigners, or, failing that, compensate all foreign interests for loss or damage caused them by the confiscation or sequestration of the property.

If it is impossible to reach an accord on the amount of compensation, the former owner can submit the matter to a mixed arbitration tribunal. If the tribunal decides that the compensation offered by the Soviet is just, the former owner must accept it, but if the tribunal rules otherwise, then the former owner can receive from the Soviet government "the right to enjoy his property under conditions at least as favorable for him in everything concerning its use and its free disposition as existed when in previous possession."

If it is found impossible to return the property, indemnity will be fixed by the arbitration tribunal and will be payable in bonds.

The Belgian idea is that insufficient stress is laid on restitution and overmuch on compensation. The Belgians think also that the article as framed gives a leasehold, not freehold, to the former owner when the property is actually returned.

LLOYD GEORGE PRESENTS WAR DANGERS.—In a notable speech to British and American press representatives at Genoa on April 26 Premier Lloyd George presented the dangers threatening Europe in the event of failure of the conference.

"The world must recognize the fact," he said, "that Russia and Germany combined contain over two-thirds of the people of Europe. Their voice will be heard, and the Russo-German treaty is the first warning of it."

As proof of the danger he cited the fact that there was no frontier line from the Baltic to the Black Sea, including the Roumanian, Galician, Polish, and Lithuanian frontiers, which had been accepted.

Mr. Lloyd George gave it as his opinion that the disorganization of Europe would affect the entire world, including the United States. He was amazed at people who ignored the portentous fact facing Europe today. Unless Europe reorganized, in other words, unless the Genoa conference succeeded in arranging a compact of peace, he was confident that in his own life, certainly in the life of the younger men present, Europe would again welter in blood.

"We triumphed in the war," he said, "but our triumph will not last forever. If our victory develops into oppression, vengeance will follow, just as Germany's action which started the world war was followed by vengeance.

"We must be just and equitable and show strength. We must realize that Europe is not on good terms and that storms are arising which we must deal with. We had hoped that the end of the great war meant the end of brute force, but unless Europe's problems are solved there is no assurance that force has given way to right."

FINANCE AND ECONOMIC REPORTS.—At the second plenary session of the conference on May 3 reports of the Economic, Finance, and Transport Committees were presented and at once adopted. The contents of the finance report was summarized as follows:

The report contained nineteen articles, the main recommendations of which are: the return of stability of currency, the freedom of banks from political pressure, a meeting in the near future of big central banks, the re-establishment of the gold basis, the balancing of budgets, the fixation of a gold value of monetary units by an international convention co-ordinating the demand for gold and an effort to obtain the co-operation of the United States.

Resolution No. 11 lays down the draft of the convention suggested for the Central Banks' meeting, emphasizing the necessity for freedom of exchange. Article thirteen nominates the Bank of England to call a meeting of the Central Banks to consider an international monetary convention. The problem of checking the flight of capital to avoid taxation is left to the League of Nations. The artificial control of exchange markets is condemned. Government loans are advised only in exceptional cases, and advice is given to depend on private capital for government financing.

PLAN FOR NON-AGGRESSION PACT.—From British sources it was learned that Premier Lloyd George's chief hope for the Genoa conference was an agreement of the thirty-two European nations represented to sign a "ten-year truce," after the character of the Four-Power Pacific Treaty, promising to refrain from aggression and to consult in case of difficulties. France on May 4 signified her willingness to sign such an agreement under three conditions: (1) that every other European nation sign; (2) that Russia agree to recognize her existing frontier for ten years; (3) that France surrender none of her rights to take action to enforce the Treaty of Versailles.

Germany objected to this last condition, but declared she would accept a provision to the effect that the Allies *acting together* retain the right to enforce the Versailles Treaty.

IRELAND

FACTIONS ATTEMPT RECONCILIATION.—During the last two weeks of April, upon the initiative of Mayor O'Neill and Archbishop Byrne of Dublin, several meetings of pro- and anti-free state leaders were held in an effort to reach a compromise agreement on the programme for approaching elections. The plans proposed proved unacceptable to Mr. de Valera.

On May 4, however, a three-days' truce was arranged between leaders of the two factions in the Irish army, during which a committee of five from each side was to consider plans for peace. According to a plan proposed, the cabinet was to be reorganized on a coalition basis; elections to the new parliament would be held in June without contest; and the vote on the treaty would be postponed until later.

GERMAN REPARATIONS

REPARATIONS ORDER REJECTED.—The conclusions of the Reparations Commission as reached in the middle of March gave Germany until May 31 to accept the Allied proposals. Germany's reply received on April 10

definitely rejected the proposed Allied supervision of German finances, and also declared impossible the new taxes to yield sixty billion marks.

Speaking at Bar-le-Duc, France, on April 26, Premier Poincaré referred to the right of France to take independent action if necessary in the event of German failure on May 31. To consider the threatened crisis, Premier Lloyd George proposed a meeting of the Supreme Council at Genoa, but this location was unacceptable to the French premier.

AMERICAN ARMY CLAIMS RECOGNIZED.—On April 11 Secretary Hughes received a note from Lord Curzon signifying that Great Britain had no desire to question American claims for the expenses of its occupation forces, and promising that the Allied governments would consult as to a proper method of payment. Belgium, France, and Italy also gave similar assurances. It was reported that a small part of the American forces would be kept on the Rhine after July 1.

NEAR EAST SETTLEMENT

On April 15 the Allied governments proposed to the Angora Turks that the Allied terms of March 16 for a Near Eastern settlement be given a general acceptance, with subsequent negotiations as to the interpretation of particular details. The Angora government, on the other hand, favored immediate discussions, and proposed Ismid as a meeting place. France and Italy were reported to approve this plan, whereas England advocated instead a warning to the Turks to cease hostilities, as a preliminary to any negotiations or the evacuation of Asia Minor by the Greeks.

Italy's withdrawal of forces from the Meander Valley in Asia Minor compelled the Greek army to extend its lines into this region, which was accomplished without difficulty.

At the beginning of May Italy announced an agreement with Turkey which appeared at first to be a compact similar to that negotiated previously for France. The agreement, however, was at least nominally with the Constantinople government, and proved not objectionable to Great Britain. It provided for concessions to Italian firms in Asia Minor.

UNITED STATES

REVISION OF RULES OF WARFARE.—*Washington, April 28.*—President Harding and Secretary Hughes will reach a decision in the next few days regarding the appointment of a representative or representatives on the international commission to revise the rules of warfare, which, under the agreement reached at the Washington conference, will consist of not more than two members representing the United States, the British Empire, France, Italy, and Japan.

The questions to be considered by the commission are whether existing rules of international law adequately cover new methods of attack or defense since the Hague conference of 1907, and, if they do not, what changes ought to be adopted.

The proposed commission, under the resolution, is at liberty to request assistance and advice from experts in international law and in land, naval,

and aerial warfare. On the conclusion of its investigating the members of the commission are to report their findings to their respective governments, and those powers are thereupon to confer as to the acceptance of the report and the course to be followed to secure the consideration of its recommendations by the other civilized powers.—*New York Times*, 29 April, 1922.

AMERICAN SOCIETY OF INTERNATIONAL LAW.—*Washington, April 28.*—The effects of the Disarmament Conference on China and Japan, on the status of America in the Far East, and on the development of international law, were brought to the fore at the sixteenth annual meeting of the American Society of International Law, which opened here last night.

"No formal treaty ever accomplished so much by doing to little," said Elihu Root, president of the society in an address on International Law and the Arms Conference." Mr. Root, outlining briefly the main achievements of the conference, stressed the value of the four-power naval treaty in doing away with mutual distrust, bringing about the end of the Anglo-Japanese Alliance as a possible war cloud upon the international horizon and encouraging the nations concerned to think in terms of peace.

Referring to China, Mr. Root said he was a believer in the "uniting of all sections and parties of the Chinese people for the establishment of an effective government which would be the means of bringing China into full possession of the rights and liberties assured by international law to the members of the family of nations, just as Japan has been brought into that family.

Rear Admiral Harry S. Knapp, speaking of the naval treaty, declared that America had been placed in a disadvantageous position by the inclusion of Article XIX, dealing with naval bases and fortifications. By the provisions of this section, the United States fortifications in the Pacific are kept in *status quo*, and are not modernized as are those of other powers.

"There is no trace of equity for the United States in Article 19," he asserted. "We are the losers in respect to position and resources. The naval treaty marks the decreased influence of the United States in the Far East, and greatly impairs her international prestige."—*Christian Science Monitor*, 29 April, 1922.

CHILI AND PERU NEGOTIATE.—A conference between Chili and Peru to settle the long standing dispute over the frontier provinces of Tacna and Arica was scheduled to begin in Washington about May 12. It was hoped that the delegates might reach a settlement by direct negotiations, the United States not taking part unless by specific request.

WRANGELL ISLAND CLAIMED FOR CANADA.—*New York, April 28.*—The desire to guard Wrangell Island from possible seizure by Japan was one of his reasons for claiming it in the name of the Dominion of Canada, Vilhjalmur Stefansson said today when asked about a report from Washington that the state department was looking into the title to the island, upon the assumption it already was a part of the territory of the United States.

"I can't see how any American claim to the territory can be substantiated," replied the explorer. "A British naval expedition under Captain Kellett declared the island a British possession in 1849. There was no question then about the British character of the island.

"There is a peculiarity about island sovereignties, however. After a period of five years, an island claimed in behalf of any nation becomes a No Man's Land unless properly inhabited and administered in behalf of that nation."—*Christian Science Monitor*, 29 April, 1922.

U. S. RUSSIAN POLICY UNCHANGED.—Speaking on May 1 to a delegation favoring the recognition of the Soviet Republic, Secretary Hughes strongly defended the American government's past policy. Secretary Hughes said in part:

"Our interest in the people of Russia has been manifested in the most unmistakable manner, and I do not think that it requires any statement at this time to indicate how anxious we are for the full restoration of the economic power of the Russian people and for their well-being in every way.

"There is no disposition to interfere with the Russian people in working out their own destiny. There is no desire to interfere in their internal affairs. The principle that is involved is one that we cherish here. Its application has been somewhat complicated by the organized efforts on the part of the Soviet régime to interfere in the domestic affairs of other peoples.

"With respect to intercourse, it is quite evident that you are under a serious misapprehension. There are no legal obstacles to trade with Russia. The obstacles that exist to trade with Russia are due to the situation in Russia, which is in the control of those who dominate the affairs of Russia. Some time ago I pointed out the essential conditions for a return to productivity in Russia. That was not a formula; that was not an artificial conception; that was simply a statement of fact. Russia needs credit, but it is idle to expect credit unless there is a basis for credit. That basis for credit cannot be supplied from the outside. That basis for credit has got to be supplied inside of Russia.

"Political recognition follows the establishment of a sound basis for intercourse. Political recognition is dependent upon the existence of a government that is competent to discharge its international obligations. This whole matter is in the control of those who dominate the affairs of Russia. We are most desirous to do what we can to aid in Russia's recuperation, but they must establish the basis for such recuperation."

FAR EAST

CIVIL WAR IN CHINA.—Toward the close of April, hostilities opened between the forces of General Chang Tso-lin, governor of Manchuria and chief military leader of northern China, and an army under General Wu Pei-fu, commander of the central Chinese forces. The fighting took place chiefly in the immediate vicinity of Peking and along the Peking-Tientsin railway.

Both generals were in the military combination that upset the pro-Japanese Anfu government at Peking two years ago. Apparently General Wu's fears were aroused by the presence of General Chang's forces near Peking and by his reported alliance with the Canton government under Sun Yat-Sen. Accordingly he struck to capture Peking and to drive General Chang's troops northward. General Wu had strong popular support, while Chang was suspected of being under Japanese influence. The Peking government itself could do nothing more than proclaim neutrality. On May 5 General Wu's forces were victorious and entered Peking.

REVIEW OF BOOKS

THE MARINES HAVE ADVANCED, by Lieutenant-Colonel Charles Bishop, Jr. Published in 1921 by the Penn Publishing Company. Price, $1.75.

This is a story for young men and for boys above sixteen years of age. It is a sequel to *The Marines Have Landed,* written by the same author and it relates the further adventures of Dick Comstock, the hero of both books. The story is full of historically accurate incidents of the years 1913 to 1917, and reflects the feelings of the enlisted men under various pleasant and unpleasant conditions that seem very true to actual life.

The stirring action makes the book excitingly interesting, and its moral and patriotic tone leaves a wholesome and stimulating effect on the reader.

The characters, Dick Comstock, the hero, and Sergeant Dorlan, the typical Irishman, are well drawn and attract the undivided sympathy of the reader from beginning to end. One very impressive and valuable chapter is that wherein the weakling, Horace Maxim, suddenly discovers that by acepting money in exchange for copies of some seemingly trifling papers he has placed himself at the mercy of his bribers, who now demand of him the performance of obviously dishonest and dangerous deeds. The agonies he undergoes for a short time vividly reveal the fearful consequences that will surely follow the first false step of an embryonic traitor. One apparent defect in the tale is that the readers reasonable expectation to see justice meted out to this despicable character is doomed to disappointment; it would seem that an offense so serious as that committed by Horace Maxim should be properly punished when detected, and yet we are told that he got his discharge and no punishment. Some parts of the book are purely historical and of sustained interest only to those who are students of history. Yet, on the whole, the book is good and deserves a large circulation. We predict that it will become popular, especially among prospective sailors and soldiers.

A. M. W.

THE BLOCKING OF ZEEBRUGGE, by Captain A. F. B. Carpenter, V. C., R. N. Houghton. Mifflin Company, 1922, Boston and New York. Price $3.50.

A large number of our officers remember Captain Carpenter most pleasantly, having attended the lectures he gave in this country in 1919, and are fairly familiar with the operations described, and consequently

pleased that he has written in permanent form of the conduct of those operations of St. George's day, 1918, which gave all of the Allies great encouragement by the dash and keenness exhibited by the forces of the Dover Patrol.

The book is dedicated to the man-in-the-street and hence the naval reader must not expect to find details of the operations explained in a manner to satisfy the desires of a technical mind. Yet they are set forth interestingly and in pleasing sequence. The number of naval craft of all kinds required to carry out the operation will astonish most certainly the layman and make the naval officer take a long breath. In order to sink three blockships at Zeebrugge in the mouth of the canal from Bruges required the co-operation of one hundred and sixty-two vessels in addition to supporting squadrons at sea, such as seven light cruisers, two leaders, and fourteen destroyers.

The origin of the plan is given as in the Admiralty about November 13, 1917. Its expected results were: (a) by a reduction in enemy activity, because of longer passage necessitated by use of more distant bases such as Heligoland, there would be a decrease in number of Allied vessels sunk by mine or submarines as well as a decrease in raid activitity by German torpedo craft; (b) the movements of high sea fleet would be hindered by the loss of such a convenient advanced base for its attendant small craft; (c) an actual reduction in number of submarines and torpedo boats, for, on an average day, many submarines and torpedo craft were repairing and resting at Bruges, would take place because of the exits of the canal being closed. The loss of prestige in the German navy must eventually become of great importance because such a bold operation would be contrasted with the navy's long inactivity.

Stonewall Jackson's phrase that one must mystify, mislead, and surprise an enemy, if he is to succeed in any such enterprise, was taken as the guiding principle in the plan which is carefully unfolded in Part I of the book and adhered to in the actual operation related vividly and interestingly in Part II.

That two starts of the expedition were made and the objective of the preparations carried out, as they were in many places and on many vessels, did not become known to the enemy speaks volumes for the efficient secrecy with which the expedition was guarded. The third start was carried through and resulted in the actual blocking of the canal and yet found the Germans absolutely unprepared to prevent this operation.

The type of manhood displayed in this operation, where gallantry and supreme disregard of self are so conspicuous, makes the navy personnel fore and aft feel the prouder of their profession and cherish the new tradition thus made.

The illustrations are very important and excellent, sufficient maps and diagrams being included to permit of a clear grasp of the situation being made by the reader.

The introduction by Admiral Earl Beatty, the appreciations by Marshal Foch, Rear Admiral Sims, and Count Visart, the Burgomaster of Bruges, express in different ways their unqualified admiration for the men and officers of the British navy engaged in this blocking of Zeebrugge, and add to the value of the book.

R. E.

JANE'S FIGHTING SHIPS, 1921; Joint Editors: Oscar Parkes, M.B., and Maurice Prendergast. (Published by Sampson Low, Marston & Co., Limited, London.)

This, the twenty-fourth issue of *Jane's Fighting Ships* (founded in 1896), comprises 633 pages of text and illustrations with 82 additional pages of classified advertisements.

The feature of this 1921 volume is the addition of a series of "Special Memoirs," dealing with the principal foreign naval powers. Each of these Memoirs is divided into three main parts: (a) administration, (b) organization of the fleet, (c) personnel. The administrative sections are subdivided into two parts, denominated "Central" and "Local." The "Central" subsections describe the composition and functions of the various navy departments or ministries of marine; also the naval staffs and advisory councils. The "Local" subsections concern the organization and control of the "Naval Districts." Naval policy and programs are also dealt with, usually under the heading of "administration." It is regrettable that no special memoir has been given for the British navy, as "time and space were not available for so enormous a task." The editors, however, have stated that this is an improvement reserved for future years. These "Memoirs" take the place of the "Special Article" introduced in last year's edition, and are drafted to a uniform system which makes them particularly useful for purposes of reference and comparison.

The larger illustration for modern battleship and battle-cruiser types used in the British navy section of the 1920 issue have been extended in this 1921 edition to the United States navy.

The minor European navies are considered in the following groups: "New Baltic Group" (Finnish and Polish navies); "North Sea Group" (German and Netherlands navies); "Scandinavian Group" (Swedish, Norwegian, and Danish navies); "Peninsula Group" (Spanish and Portuguese navies); "Balkan Group" (Grecian, Roumanian, Austrian, and Hungarian navies). It is interesting to note that the German navy has undergone a complete reorganization which is described in a "Special Memoir."

Another innovation is an "obituary list" of deleted ships accompanied by notes explaining their disappearances.

The editors are indeed to be congratulated on their skill and industry in gathering together data covering more than six thousand warships with plans, silhouettes, sketches, and photographs which go to make up this indispensible encyclopedia of the navies of the world.

C. C. G.